SOUTHEAST ALASKA/YAKUTAT ANNUAL HERRING RESEARCH REPORT, 1993

By
Robert Larson
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Regional Information Report No. 1J93-19

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Alaska Department of Fish and Game
Commercial Fisheries Management and Development Division
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ABSTRACT

The pacific herring, *clupea pallasi*, is an important food and bait fish in Southeast Alaska. The 1993 winter bait fisheries occurred in Craig, Ernest Sound, Hobart Bay and Port Houghton for a total harvest of 629 tons. The spring gillnet sac roe harvest from the Cat Island area totaled 737 tons, and the seine sac roe harvest from Sitka totaled 10,216 tons. Roe-on-kelp fisheries occurred in Hoonah Sound and Craig. The total exvessel value of the region's herring fisheries was estimated at $3,740,000. Approximately 3,000 herring were sampled for age and growth analysis from the major stocks. The 1988 year class remained dominant throughout most of the region with good recruitment of younger fish in most stocks, with the exception of Sitka, where very few age 3 and 4 fish were present. Spawn deposition surveys to compute spawning biomass were conducted on 10 spawning stocks for a total escapement estimate of 59,252 tons. A series of aerial and skiff spawning ground surveys conducted on those, and smaller stocks, documented a total of 158.5 miles of beach receiving spawn in Southeast Alaska, and an additional mile in Yakutat. Forty-four paired herring roe-on-kelp samples were collected by department divers from the spawning ground egg deposition surveys for analysis in the laboratory to calibrate individual diver visual estimates. Correction ratios by diver and substrate for all samples taken since 1982 ranged from 0.85 to 1.3 of the visual estimates.

INTRODUCTION

The Alaska Department of Fish and Game's herring research project was initiated in 1971 in response to greater demands on the resource by the commercial bait and developing sac roe fisheries. The goal of this project is to provide the biological data necessary for the scientific management of the region's herring stocks. The current program of assigning bait and sac roe fisheries to target separate stocks, monitoring the stocks through age and growth analysis to determine stock conditions, and conducting spawn deposition biomass estimation studies as a basis for establishing commercial harvest quotas are project objectives. Project personnel conduct aerial and skiff surveys throughout the region to document spawning activities and assist in the inseason management of the commercial fisheries.

COMMERCIAL FISHERIES

Methods and Procedures

Sac Roe Fisheries

Commercial sac roe fisheries were conducted at Cat Island and Sitka during the 1993 season. Harvest in the Cat Island gillnet fishing area was 737 tons, considerably less than the 10,216 ton seine harvest in Sitka (Table 1).

Winter Bait Fisheries

Winter food and bait fisheries were conducted in Craig, Lisianski, Deer Island, Hobart Bay/Port Houghton and Necker Bay. Quality and concentration of stocks were limiting factors during the 1993 season. Of the areas open to commercial harvest, none achieved their harvest guideline quotas.

Roe-on-kelp Pound Fisheries

Roe-on-kelp pound fisheries were conducted in Craig and Hoonah Sound. In Craig, 15% of the established biomass was allocated to the commercial roe-on-kelp fisheries, and 85% was allocated to the commercial bait harvest. For the Hoonah Sound roe-on-kelp fishery, the Board of Fisheries established a 150 tons of herring (12 tons of roe-on-kelp) harvest guideline.

Results and Discussion

Sac Roe Fisheries

Sitka Sound

Prior to commercial harvest activities, a local purse seiner was contracted by the state to conduct a test fishery in Sitka Sound. A total of 70 tons of herring was harvested from the test fishery. These fish were sold to Sitka Sound Seafoods to support management of the fishery. Preliminary age class information was also obtained to assist department personnel in determining age class strength. On March 24, 1993 it was announced that the Sitka sac roe herring fishery would be placed on 2-hour notice effective 8:00 a.m., Friday, March 26. Based on intense spawning observed on March 27, and good roe percentages from the test fishing efforts, the sac roe fishery opened at 2:00 p.m., closed at 6:00 p.m. on March 27, and continued each day thereafter from 8:00 a.m. to 4:00 p.m., with a maximum catch not to exceed 5,000 tons. On March 29, the fishery closed at 1:00 p.m. with a 5,200 ton harvest. On March 30, the fishery was moved to the southern end of Sitka Sound where 2,000 tons were harvested on March 30 and 31. On April 2, an additional 1,100 tons of herring were harvested, bringing the total harvest to 8,500 tons. The fishery closed at 11:20 a.m., April 3, 1993 with a total harvest of 10,216 tons, and a 10.7 average roe percentage. Eight companies, 50 permit holders, and 76 tenders participated in this year's "competitive/cooperative" fishery. Processors paid a base price of $200 a ton for sac roe herring, which produced an exvessel value of approximately $2,030,800.

Kah Shakes/Cat Island

During the spring of 1992, the majority of the herring spawned in the Cat Island area with only a small portion spawning in the traditional Kah Shakes area. The quota for the Kah Shakes/Cat Island area was set at 867 tons from the 1992 spawning ground survey data. The Metlakatla Indian Community (MIC) requested the State of Alaska halt the 1993 fishery until stock verification could be determined for the Cat Island area. Due to the intent of MIC to harvest herring within the reservation boundaries, the commissioner reduced the quota by 150 tons, MIC's long term average sac roe catch. The Kah Shakes/Cat Island area was placed on 12-hour notice effective 12:00 noon, March 31, 1993. Department personnel monitored the area for herring spawn activity. On April 10, 1993 the Cat Island area was placed on 2-hour notice effective at 8:00 a.m. The fishery was then opened at 10:00 a.m. on April 10, and 104 boats harvested 725 tons of herring with an average roe percent of 16.21. The Cat Island fishery closed at 5:00 p.m., with a 1-hour grace period, on April 10, 1993. Processors paid an adjusted price of $1,600 a ton for 16% roe, giving the fishery an exvessel value of $1,160,000.

Winter Bait Fisheries

Craig/Klawock

The Craig/Klawock winter food and bait fishery was opened at 8:00 a.m., Tuesday, January 12, 1993 with a guideline harvest level of 1,362 tons. Although a large biomass of herring had been located in the fishery area, the herring remained deep and fishermen and processors were unhappy with the small size of the fish. Ten boats eventually harvested 629 tons of herring from the area, far short of the established quota. The fishery was closed at 11:59 p.m. on February 28, 1993. Processors paid approximately $240 a ton, for a total exvessel value of $150,960.

Ernest Sound (Deer Island)

With a guideline harvest level of 200 tons of herring, it was announced that at 8:00 a.m., January 12, 1993, the Deer Island area would be open for the commercial harvest of herring. The fishery was closed at 11:59 p.m. on February 28, 1993. Due to the absence of abundant stocks in the area and the generally small size of the fish, only 8 tons of fish were harvested from the quota. The exvessel value was approximately $1,920.

Hobart Bay/Port Houghton

The Hobart Bay/Port Houghton area was opened to commercial harvest on January 12, 1993, with a guideline harvest level of 500 tons. Due to a lack of herring within the open area, no fish were harvested during the season. The department announced it would reopen the area if adequate stocks were located after the February 28 deadline but no requests were received. During the spring of 1993 the department contracted a gillnet vessel to conduct a test fishery in the Hobart Bay/ Port Houghton area. Funds obtained from this test fishery were later used to support management for the area.

Lisianski Inlet

With a guideline harvest level of 720 tons, Lisianski Inlet was opened for commercial harvest at 8:00 a.m., January 12, 1993. Three boats were present in the area. Fishing went very slowly, with the fish being either too deep or too small. On January 12, 1993 the area was expanded to include portions of Cross Sound and Port Althorp in Section 14-A. The extended area remained open throughout the season with no harvest. On the traditional February 28 closure date, only 145 tons had been harvested from the original area. Since the quota had not been met, the department announced Lisianski would remain open

until March 15. Due mainly to the small size of fish in the area, only 239 tons were harvested from the quota, for an exvessel value of approximately $57,360.

Necker Bay

Necker Bay was opened on January 12, 1993 with a guideline harvest level of 200 tons. Two boats were present in the area. Fishing remained slow due to the depths of the schools. Upon arrival of the traditional closure date, only 176 tons had been harvested. The fishery was extended through March 15, 1993. The final catch for Necker Bay remained at 176 tons, giving the fishery an exvessel value of approximately $42,240.

Roe-on-kelp Pound Fisheries

Craig/Klawock

On December 21, 1992, Craig/Klawock herring pound application forms became available in the Ketchikan office with a January 31, 1993 deadline. Of the 389 applications received, 209 permits were issued. Allocations of 229 blades of macrocystis kelp and 1.15 tons of herring were given to each permit holder. On April 17, 1993, the department opened seining for the introduction of herring into the pounds. Seining continued until Wednesday, April 28. Harvesting began on April 20, with 23 individuals harvesting roe-on-kelp. There were 5.7 tons of product harvested. Four companies bought product at an average price of $4.17/lb, giving the fishery an exvessel value of $47,882. All pounds were required to be removed from the water by June 6, 1993.

Hoonah Sound

Permit applications became available in the Sitka office for the Hoonah Sound pound fishery on December 21, 1992, with a January 31, 1993 deadline. Of the 230 applications received, 115 permits were issued. During this year's fishery, 101 fisherman were present on the grounds and were allocated equal shares of 1.3 tons of herring and 160 blades of kelp. Seining for herring occurred from April 26 through May 3. Of the 115 fishermen operating pounds, 61 captured herring to sell as roe-on-kelp. An estimated 10.8 tons of roe-on-kelp were sold in the 1993 fishery, for an exvessel value of approximately $249,000. It was announced that all pounds were to be removed from the water by June 6, 1993.

AGE AND GROWTH ANALYSIS

Methods and Procedures

Herring samples were collected during research surveys, aerial surveys, and the commercial fisheries from stocks located throughout Southeast Alaska (Figure 1). Collection gear varied with location, but included purse seines, cast nets and gillnets. Cast nets were used when fish were in shallow water during spawning. Sampling was conducted on the spawning grounds and in prespawning areas. Herring sampled from the commercial fisheries were collected from individual fishermen or tenders on the fishing grounds. The times and geographic locations of collection were recorded. A target collection goal of at least 420 fish from each stock, including commercial fishery and spawning ground sites, was established. All samples were either processed fresh or they were frozen for examination and collection of scales in the laboratory.

After thawing in the laboratory, the standard length (mm) of each fish, (tip of snout to posterior margin of the hypural plate) was measured on a caliper measuring board. Fish were weighed on an electronic balance to the nearest whole gram.

A scale was removed from each fish for age analysis. Scales were cleaned and dipped in a solution of 10% mucilage glue and water and placed unsculptured side down on glass slides. Aging was conducted using a dissecting microscope, varying the light source for optimum image of the annuli. Scale reading results were spot-checked by a second reader for age verification. The fish were assigned an anniversary date for each completed growing season. All samples were collected before growth resumed in the spring. For example, if a herring hatched in the spring of 1991 and was collected in the fall of 1992, two growing seasons had occurred (age 2). If the herring had been collected in the spring of 1993 before growth had resumed, it was also recorded as age 2.

In order to provide real-time age frequency analysis either prior to, or during a commercial fishery, sampling was conducted onboard department research vessels. This enabled department personnel to provide the commercial fishing fleet and processors with accurate age, length, and weight determinations.

Results and Discussion

A total of 2,911 fish were aged, sexed, weighed and measured for length (Appendix A). Analysis has been completed for samples taken from Cat Island, Craig, Sitka, Seymour Canal, Ernest Sound and Lisianski Inlet (Figure 2). Samples still awaiting analysis include Hobart Bay, Port Houghton, Yakutat, Tenakee, Vixen Inlet, the McFarland Islands and the Ketchikan area. It is anticipated that these samples will be completed by September 30, 1993. Overall, age five fish dominated the spawning population

throughout the region with the exception of Lisianski Inlet and Ernest Sound (Deer Island), which showed a strong 2 and 3-year-old class. Recruitment of age 2-, 3- and 4-year-old fish was strong throughout most of Southeast Alaska, with the exception of the Sitka area, where 5-year old fish represented approximately 87% of the population.

SPAWN DEPOSITION SURVEYS

Methods and Procedures

The objective of the spawn deposition survey is to compute a spawning population biomass estimate. These estimates are used as a basis for establishing commercial harvest quotas and, in conjunction with age and growth data, as a means to develop life history information such as spawner/recruit relationships and stock-specific growth and mortality rates.

The foundation for defining herring stocks within Southeast Alaska is the site-specific, traditional herring spawning location. A series of aerial and vessel surveys are conducted to document the occurrence of spawning activities at sites during the spring spawning period to document spawn timing and to provide an index of abundance in terms of the nautical miles of beach that received herring spawn. The presence of eggs on intertidal kelp, milt present in the water, herring schools, and bird and sea mammal activity are all important indicators of herring and spawn abundance.

The distribution of herring eggs within the spawning area, the substrate type, and egg densities are determined by divers using SCUBA (Self Contained Underwater Breathing Apparatus). This information is used to document the spawn and compute a total number of eggs present within the survey area. Knowing the total number of eggs present enables us to back-calculate the spawning biomass as a whole, or by cohort analysis by applying age composition and size-at-age data from the age and growth analysis.

A series of strip transects, perpendicular from the shore, are selected from inside the boundaries of the spawning area as described by the aerial and skiff surveys. Divers follow a compass course from the upper intertidal zone to deeper water until spawn or vegetation disappears. Sample data, consisting of depth, bottom type, vegetation type and number of eggs within a $0.1m^2$ plastic pipe frame, is taken every 5 meters. After the length of spawn, width of spawn, and average density of eggs is used to determine the number of eggs, an index value of 100,000,000 eggs per ton of spawners is used to estimate the spawning biomass in short tons.

Results and Discussion

Comprehensive spawning ground surveys utilizing SCUBA were conducted in the Cat Island, Craig, West Behm Canal, Ernest Sound, Seymour Canal, Tenakee Inlet, Sitka, Hoonah Sound and Lisianski areas in 1993. Length and width of spawn, egg density and resultant escapement are summarized for these areas in Table 2. The first survey was initiated in Craig on April 8 and the last was completed in Seymour Canal on May 11. The surveys documented a total escapement for these areas of 59,252 tons. Maps of the spawning area, transect locations, and individual transect raw data are presented in Appendix B. The series of periodic aerial and skiff surveys conducted between early March and late May to document spawning in each of these major spawning areas, as well as maps of spawn occurring in some smaller stocks is presented in Appendix C. The total spawn for Southeast Alaska was 158.5 nautical miles, with an additional 1.0 nautical mile in Yakutat.

Kah Shakes/Cat Island

Spawning activities in this area were confined totally to the Cat Island area for the first time since the inception of the gillnet sac roe fishery in 1976. Spawn deposition surveys were conducted on April 22, 23 and 24, about 12 days after the start of the major spawning activity, and 9 days after the last of the active spawn. Weather was very good and bird predation about normal. Skiff surveys noted an additional 0.4 nautical miles of beach receiving spawn over what was noted from the aerial surveys. Based on the results from last year's spawn deposition surveys, 20 transects were established randomly over the original 13.6 nautical miles of shore, and the additional 0.4 miles given equal weight. The total escapement estimate was 6,931 tons based on 14.0 miles of spawn, an average width of 182 meters, and a density of 132,198 eggs/m^2.

West Behm Canal

Based on the amount of spawn reported in 1992, and the controversial nature of the herring fisheries in the Ketchikan area, greater effort was expanded to document spawn in the West Behm Canal area in 1993. The first active spawn was reported on April 13 in Clover Passage at Tatoosh Islands and Survey Point. Active spawning continued on both shores of lower West Behm Canal through April 20. The first spawn deposition surveys ever attempted for this area were conducted on April 25 and 26. We established 14 transects along 13.6 nautical miles of spawn. The total escapement estimate was 3,854 tons, based on an average width of 73 meters and a density of 189,925 eggs/m^2.

Craig

The spawn in the Craig area occurred in two distinct phases. The normal first spawn that usually occurs around the middle of March started March 26 and lasted until April 2. A series of 18 separate "spot" spawns started on April 16 and lasted for two weeks. A spawn deposition dive survey was conducted on April 8 on what we felt was a significant spawn (6.5 nautical miles around Fish Egg Island). An average width of spawn of 134 meters, a density of 359,758 eggs/m^2, and 6.5 nautical miles of spawn produced a biomass estimate of 6,456 tons. An additional 500 tons of biomass was added to account for the additional 1.9 nautical miles of spawn. The total biomas estimate was then 6,956 tons for the total 8.4 nautical miles of spawn recorded.

Ernest Sound

The amount of herring observed during the spring, and the numbers of birds and sea lions were much reduced from the previous year. Although the number of miles of herring spawn was similar to 1992, the density of spawn was much less. Spawning activity started on April 23, finished April 24, and was restricted to the waters of Vixen Inlet. No activity was noted at Onslow Island, Meyers Chuck or Union Bay. A total of 14 transects were used to compute an escapement biomass of 684 tons based on 9 nautical miles of spawn, 87 meters of width and a density of 42,413 eggs/m^2.

Port Houghton/Hobart Bay

Spawn in this area was divided: 6.6 nautical miles in Port Houghton, 5.1 nautical miles in Hobart Bay, and 0.6 nautical miles inside Sunset Island. Aerial and skiff surveys were initiated April 15 and ended May 5, with the first spawn occurring on April 21, and major spawning occurring between April 22 and April 25. No herring or spawn was observed after April 25. The spawn deposition estimate was conducted on May 5 under good conditions. The spawn for the three areas was combined and 15 transects were used to compute an escapement estimate of 2,238 tons, using 12.3 nautical miles of spawn, with an average width of 114 meters, and an average density of 77,557 eggs/m^2.

Seymour Canal

The first schools of herring were observed near the beach on April 25. The first active spawn occurred April 28 with major spawning through May 3. This spawn extended from Point Hugh to Sorefinger Cove and totaled 9.2 nautical miles. An additional 1.75 nautical miles of spawn were reported from inside #9 rock on May 18 and 19. A spawn deposition survey was conducted May 10 and 11 on the original 9.2 nautical miles of spawn. The spawn estimate indicated 2,525 tons of herring spawned in this area. Using the 101 meters for the average width of a transect, 132,199 eggs/m^2, and a total of 10.95 nautical miles of spawn, a total spawn estimate of 3,005 tons was calculated.

Sitka

The Sitka area spawn monitoring program started with aerial surveys on March 19 and continued with two separate spawn deposition surveys and aerial surveys through April 21. The first spot spawn occurred at Silver Point on March 24, with major spawning March 26 to April 3 north of the bridge, March 31 to April 4 and April 19 in Eastern Channel, and April 11 and April 20 in the Kanga Bay and Goddard areas. A total of 27.5 nautical miles of spawn occurred north of the bridge, and 27.8 nautical miles south of the bridge to Crawfish Inlet, for a grand total of 55.3 nautical miles. As part of a cooperative study with the USF&WS, a separate spawn deposition survey was conducted for the area inside the proposed breakwater, just north of the bridge on April 10 and 11. For the one nautical mile of beach receiving spawn within the proposed boat harbor, an escapement estimate of 1,721 tons was computed using 267 meters average width and 313,182 eggs/m^2. A second spawn deposition survey was conducted for the spawn that occurred in Eastern Channel and north of the bridge. An average transect width of 91 meters and average density of 349,086 eggs/m^2 was applied to all areas of spawn north of Cape Burunof for a total of an additional 31,076 tons. For the 5.3 miles of spawn that occurred between Crawfish Inlet and Cape Burunof an estimate of 2,500 tons was used. The sum of these three estimates produced a total escapement estimate for Sitka Sound of 35,297 tons.

Hoonah Sound

Active spawn in the Hoonah Sound area occurred during April 27, 28 and 29, and was restricted to the southeast portion of Emmons Island, the southwest corner of Moser Island, and the shoreline to the east of Fick Cove. The spawn was characterized as light during those days, and totaled 5.75 nautical miles. Fishermen had a difficult job making sets for large numbers of herring and many were unsuccessful in catching any for their pounds. A spawn deposition survey was conducted on May 6 using 12 transects. An escapement estimate of 1,099 tons was computed based on 5.75 nautical miles of spawn, an average width of 89 meters and a density of 104,142 eggs/m^2.

Tenakee Inlet

Active spawning in Tenakee started on April 21 when approximately three nautical miles of light spawn was noted in Seal Bay and near Corner Bay Point. The last active spawn was observed on April 23. The spawn deposition survey occurred May 7 and 8. An escapement estimate of 904 tons was computed using 6.4 nautical miles of spawn, 74 meters average width, and 92,714 eggs/m^2.

Lisianski

Aerial surveys of the Lisianski Strait and Inlet area were initiated on April 23. The first active spawn consisted of two spots near town with the expected major spawning event never materializing. Small areas of spawn were observed from April 29 to May 3 with no more than 1/4 mile observed at any one location. Local residents of Pelican also noted the lack of spawn occurring in the inlet. A very large biomass of herring was reported wintering in the inlet during the January bait fishery and 15 miles of spawn had been reported in 1992. A spawn deposition survey was conducted on May 9, and a total of 5.2 nautical miles of spawn was noted. An escapement estimate of only 522 tons was calculated for the strait and inlet based on 5.2 nautical miles of spawn, an average width of 50 meters and a density of 98,212 eggs/m^2. The lack of spawn in this area was unexpected and disappointing.

DIVER VISUAL ESTIMATION CALIBRATION

Methods and Procedures

Samples of substrate with eggs are collected during the spawn deposition surveys for counting at the laboratory in Ketchikan to verify visual density estimates. The objective of this phase of the project is to determine a diver substrate-specific calibration figure that is used to adjust visual egg density estimates for individual divers.

A 0.1 m^2 sample with vegetation and eggs is collected in small sample bags (approximately 2 liter capacity) during the spawn deposition surveys. These kelp and egg samples were transferred from the diver's bag to 4 liter (1 gallon) size, water-tight zip lock bags and preserved in Gilson's fluid. Only a small amount, 0.5 liter, is added to a sample for preservation. The following is a detailed procedure for determining egg densities from collected samples.

1. Decant the Gilson fluid from the sample bags.

2. Add one normal KOH to the sample bag and mix thoroughly through the sample. Allow the sample to soak for 1.5 hours in KOH digestive hydrolysis. Placing the sample bag in a hot water bath accelerates digestion (eel grass can stand a strong digestion, while other kelps disintegrate quickly, impeding egg sorting).

3. Drain off KOH and place sample in a 4 liter (1 gallon) plastic bucket.

4. Repeat cold water washes of the sample to loosen the attached eggs. Decant and filter each wash through a fine mesh sieve. The majority of the eggs in the sample can be removed and collected from the filtrate.

5. The remaining eggs must be cleaned from the substrate by careful manual scraping. The loose eggs must be clean of kelp debris for accurate volumetric analysis.

6. Hand-count and record all eggs that are lost or cannot be cleaned from the substrate.

7. The loose egg sample must be allowed to soak in 1.0 normal buffered formal saline solution for approximately 24 hours to assure a standardized volumetric displacement.

8. The preliminary step in quantitative analysis is to determine the standard displacement of 1,000 eggs. This is done by hand-counting 1,000 eggs from a number of samples and determining the average displacement.

9. Hand-counted totals are added to the sample displacement and this figure is expanded by a factor of 10 to determine eggs/m^2 at each sample station. One technician can work up approximately six samples per day at a chemical cost of about $3.00 per sample.

Results and Discussion

A total of 106 pairs of visually estimated and laboratory counted samples of vegetation with eggs were determined for project divers from 44 quadrants (Table 3). Correction ratios by diver and substrate for all samples taken since 1982 range from 0.85 to 1.3 of the visual estimates (Table 4). The lack of individual diver effects is attributed to the training and experience of the divers. The correction ratios are used in the spawn deposition surveys to adjust the total visual estimates of each diver before summing the total eggs in the survey area. Correction figures are achieved by taking a laboratory count of the collected samples and dividing them by their dive estimates. The calibration figure for a particular diver is then applied to his dive count when estimating the total egg deposition number.

Table 1. Summary of 1992/1993 season herring fisheries.

Winter Food and Bait Fishery

Opening	Closing	District	Area	Assessment (tons)	Quota* (tons)	Harvest (tons)	Percent Harvest
1/12/93	2/28/93	3/4	Bocas de Finas/Meares Pass	12,300	1,362	623.0	12.9
1/12/93	2/28/93	10	Hobart Bay/Port Houghton	4,100	500	0	12.1
1/12/93	3/15/93	13	Lisianski Inlet	5,750	720	239.0	12.6
1/12/93	2/28/93	7A	Deer Island	2,050	200	8.1	10.0
1/12/93	3/15/93	13B	Necker Bay	2,000	200	176.0	10.0
Total				222,000	2,582	855	

Sac Roe Fishery

Date	District	Area	Gear	Assessment (tons)	Quota* (tons)	Harvest (tons)	Percent Harvest	Roe Percent
3/27-4/3	13	Sitka	Seine	48,450	9,691	10,216	20.0	10.7
4/10-4/10	01	Cat Island	Gill Net	8,100	717	737	10.7	16.2
Total				56,550	10,408	10,965		

Roe on Kelp Fishery

Harvest Date	District	Area	Gear	Assessment (tons)	Quota* (tons)	Harvest (tons)	Percent Harvest	Quota (tons)
4/17-4/28	103-60	Craig	Seine	12,350	240	5.3	15.0	19.2
4/26-5/3	113-55	Hoonah Sound	Seine	5,750	150**	12.0	2.6	12.2
Total				18,100	590		17.3	

* Quota expressed as percent harvest of previous year's escapement estimate.

** Pound quota set by Board of Fisheries at 150 tons of herring.

Table 2. Southeast Alaska herring spawn deposition surveys results, 1993.

CAT ISLAND AREA					
Number of estimates	728	TM	TK	RL	PD
Unadjusted sum of estimates by diver		3326	4538	2125	450
Corrected sum of estimates by diver		2827.1	3902.7	2358.8	535.5
Total number of eggs/.1meter quadrant (1,000s)	9,624				
Average length of transects in meters	182	(total samples*5 meters/total [20] transects)			
Lineal meters of shoreline receiving spawn	25,928	(14.0 nautical miles of shore* 1852 meters/nmile)			
Area of survey in square meters	4,718,896	(length of shoreline * average width of transects)			
Average density of quadrant samples (1,000s)	13.2	(total eggs[1,000s] / total number of observations)			
Average density of eggs per square meter	132,198	(average .1 meter quadrant sample*1,000 eggs*10 meters)			
Total number of eggs in survey area	623,829,624,600	(total survey area in meters * total eggs per meter)			
Unadjusted escapement estimate in tons	6,238	(total number of eggs / 100,000,000 eggs per ton of spawners)			
Corrected escapement using 10% egg loss (tons)	6,931	(adjustment to account for 10% egg loss prior to survey)			
Corrected escapement in pounds	13,862,881	(tons * 2,000)			
WEST BEHM CANAL AREA					
Number of estimates	203	RL	TM	TK	PD
Unadjusted sum of estimates by diver		3	2871	666.1	705
Corrected sum of estimates by diver		3.3	2440.4	572.8	839.0
Total number of eggs/.1meter quadrant (1,000s)	3,855				
Average length of transects in meters	73	(total samples * 5 meters / total [14] transects)			
Lineal meters of shoreline receiving spawn	25,187	(13.6 nautical miles of shore* 1852 meters/nmile)			
Area of survey in square meters	1,826,072	(length of shoreline * average width of transects)			
Average density of quadrant samples (1,000s)	19.0	(total eggs[1,000s] / total number of observations)			
Average density of eggs per square meter	189,925	(average .1 meter quadrant sample*1,000 eggs*10 meters)			
Total number of eggs in survey area	346,816,589,669	(total survey area in meters * total eggs per meter)			
Unadjusted escapement estimate in tons	3,468	(total number of eggs / 100,000,000 eggs per ton of spawners)			
Corrected escapement using 10% egg loss	3,854	(adjustment to account for 10% egg loss prior to survey)			
Corrected escapement in pounds	7,707,035	(tons * 2,000)			
CRAIG AREA					
Number of estimates	161	TM	RL	SW	
Unadjusted sum of estimates by diver		4098	2080	262	
Corrected sum of estimates by diver		3483.3	2308.8	324.9	
Total number of eggs/.1meter quadrant (1,000s)	5,792				
Average length of transects in meters	134	(total samples * 5 meters/total [6] transects)			
Lineal meters of shoreline receiving spawn	12,038	(6.5 nautical miles of spawn * 1852 meters/nmile)			
Area of survey in square meters	1,615,098	(length of shoreline * average width of transects)			
Average density of quadrant samples (1,000s)	36	(total eggs [1,000s] / total number of observations)			
Average density of eggs per square meter	359,758	(average .1 meter quadrant sample*1,000 eggs * 10 meters)			
Total number of eggs in survey area	581,044,165,000	(total survey area in meters * total eggs per meter)			
Unadjusted escapement estimate in tons	5,810	(total number of eggs / 100,000,000 eggs per ton of spawners)			
Corrected escapement using 10% egg loss (tons)	6,456	(adjustment to account for 10% egg loss prior to survey)			
Adjustment for additional 1.9 nmiles spawn	500	(tons of herring contributed by later spawning herring)			
Total corrected escapement in pounds	13,912,093	(tons * 2,000)			

Table 2. Southeast Alaska herring spawn deposition surveys results, 1993 (cont.).

VIXEN INLET AREA					
Number of estimates	244	RL	TM	TK	WB
Unadjusted sum of estimates by diver		198	284	195	406
Corrected sum of estimates by diver		219.8	241.4	167.7	406.0
Total number of eggs/.1meter quadrant (1,000s)	1,035				
Average length of transects in meters	87	(total samples * 5 meters / total [14] transects)			
Lineal meters of shoreline receiving spawn	16,668	(9.0 nautical miles of shore * 1852 meters/nmile)			
Area of survey in square meters	1,452,497	(length of shoreline * average width of transects)			
Average density of quadrant samples (1,000s)	4.2	(total eggs[1,000s] / total number of observations)			
Average density of eggs per square meter	42,413	(average .1 meter quadrant sample*1,000 eggs*10 meters)			
Total number of eggs in survey area	61,604,928,000	(total survey area in meters * total eggs per meter)			
Unadjusted escapement estimate in tons	616	(total number of eggs / 100,000,000 eggs per ton of spawners)			
Corrected escapement using 10% egg loss	684	(adjustment to account for 10% egg loss prior to survey)			
Corrected escapement in pounds	1,368,998	(tons * 2,000)			
HOBART BAY/PORT HOUGHTON AREA					
Number of estimates	342	RL	WB		
Unadjusted sum of estimates by diver		1595	882		
Corrected sum of estimates by diver		1770.5	882		
Total number of eggs/.1meter quadrant (1,000s)	2,652				
Average length of transects in meters	114	(total samples * 5 meters/total [15] transects)			
Lineal meters of shoreline receiving spawn	22,780	(12.3 nautical miles of shore * 1852 meters/nmile)			
Area of survey in square meters	2,596,874	(length of shoreline * average width of transects)			
Average density of quadrant samples (1,000s)	7.8	(total eggs[1,000s] / total number of observations)			
Average density of eggs per square meter	77,557	(avg .1 meter quadrant sample * 1,000 eggs * 10 meters)			
Total number of eggs in survey area	201,405,833,400	(total survey area in meters * total eggs per meter)			
Unadjusted escapement estimate in tons	2,014	(total number of eggs / 100,000,000 eggs per ton of spawners)			
Corrected escapement using 10% egg loss (tons)	2,238	(adjustment to account for 10% egg loss prior to survey)			
Corrected escapement in pounds	4,475,685	(tons * 2,000)			
SEYMOUR CANAL AREA					
Number of estimates	444	RL	TM	WB	BD
Unadjusted sum of estimates by diver		1543	837	3330	104
Corrected sum of estimates by diver		1712.7	711.5	3330.0	115.4
Total number of eggs/.1meter quadrant (1,000s)	5,870				
Average length of transects in meters	101	(total samples * 5 meters / total [22] transects)			
Lineal meters of shoreline receiving spawn	17,038	(9.2 nautical miles of shore * 1852 meters / nmile)			
Area of survey in square meters	1,719,329	(length of shoreline * average width of transects)			
Average density of quadrant samples (1,000s)	13.2	(total eggs[1,000s] / total number of observations)			
Average density of eggs per square meter	132,199	(average .1 meter quadrant sample * 1,000 eggs * 10 meters)			
Total number of eggs in survey area	227,293,030,473	(total survey area in meters * total eggs per meter)			
Unadjusted escapement estimate in tons	2,273	(total number of eggs / 100,000,000 eggs per ton of spawners)			
Corrected escapement using 10% egg loss	2,525	(adjustment to account for 10% egg loss prior to survey)			
Corrected escapement in pounds	5,050,956	(tons * 2,000)			

Note: This estimate was based on the first 9.2 nautical miles of spawn.
An additional 1.75 nautical miles of spawn of later spawn at current densities=480 tons.

Original estimate (9.2 nautical miles)	2525 tons
Additional spawn estimate (1.75 nautical miles)	480 tons
Grand Total	3005 tons

Table 2. Southeast Alaska herring spawn deposition surveys results, 1993 (cont.).

SITKA BOAT HARBOR				
Number of estimates	267	RL	TM	
Unadjusted sum of estimates by diver		610	9041	
Corrected sum of estimates by diver		677.1	7684.9	
Total number of eggs/.1meter quadrant (1,000s)	8,362			
Average length of transects in meters	267	(total samples * 5 meters / total [5] transects)		
Lineal meters of shoreline receiving spawn	1,852	(1.0 nautical miles of shore * 1852 meters / nmile)		
Area of survey in square meters	494,484	(length of shoreline * average width of transects)		
Average density of quadrant samples (1,000s)	31.3	(total eggs[1,000s] / total number of observations)		
Average density of eggs per square meter	313,182	(average .1 meter quadrant sample*1,000 eggs*10 meters)		
Total number of eggs in survey area	154,863,314,000	(total survey area in meters * total eggs per meter)		
Unadjusted escapement estimate in tons	1,549	(total number of eggs / 100,000,000 eggs per ton of spawners)		
Corrected escapement using 10% egg loss	1,721	(adjustment to account for 10% egg loss prior to survey)		
Corrected escapement in pounds	3,441,407	(tons * 2,000)		
SITKA SOUND AREA				
Number of estimates	435	BDJ	RL	TM
Unadjusted sum of estimates by diver		60	8378	6391
Corrected sum of estimates by diver		61.8	9299.6	5432.4
Total number of eggs/.1meter quadrant (1,000s)	14,794			
Average length of transects in meters	91	(total samples * 5 meters/total [24] transects)		
Lineal meters of shoreline receiving spawn	90,748	(49.0 nautical miles of shore * 1852 meters / nmile)		
Area of survey in square meters	8,224,038	(length of shoreline * average width of transects)		
Average density of quadrant samples (1,000s)	34.0	(total eggs[1,000s] / total number of observations)		
Average density of eggs per square meter	340,086	(average .1 meter quadrant sample*1,000 eggs*10 meters)		
Total number of eggs in survey area	2,796,877,937,583	(total survey area in meters * total eggs per meter)		
Unadjusted escapement estimate in tons	27,969	(total number of eggs / 100,000,000 eggs per ton of spawners)		
Corrected escapement using 10% egg loss	31,076	(adjustment to account for 10% egg loss prior to survey)		
Corrected escapement in pounds	62,152,843	(tons * 2,000)		

Note: This spawn estimate is based on the total spawn north of Cape Burunof (50.0 nautical miles) less the spawn occurring inside the proposed boat harbor (1.0 nautical mile).
An estimate of biomass of spawners south of Cape Burunof is 2,500 tons based on average Sitka Sound escapement densities (5.3 nautical miles).

Biomass estimate north of Cape Burunof	31,076 tons
Biomass estimate of small boat harbor	1,721 tons
Biomass estimate Crawfish Inlet to Cape Burunof	2,500 tons
Grand Total	35,297 tons

HOONAH SOUND AREA				
Number of estimates	214	RL	TM	WB
Unadjusted sum of estimates by diver		674	160	1344.5
Corrected sum of estimates by diver		748.1	136	1344.5
Total number of eggs/.1meter quadrant (1,000s)	2,229			
Average length of transects in meters	89	(total samples * 5 meters / total [12] transects)		
Lineal meters of shoreline receiving spawn	10,649	(5.75 nautical miles of shore * 1852 meters / nmile)		
Area of survey in square meters	949,536	(length of shoreline * average width of transects)		
Average density of quadrant samples (1,000s)	10.4	(total eggs[1,000s] / total number of observations)		
Average density of eggs per square meter	104,142	(average .1 meter quadrant sample * 1,000 eggs * 10 meters)		
Total number of eggs in survey area	98,886,614,000	(total survey area in meters * total eggs per meter)		
Unadjusted escapement estimate in tons	989	(total number of eggs / 100,000,000 eggs per ton of spawners)		
Corrected escapement using 10% egg loss	1,099	(adjustment to account for 10% egg loss prior to survey)		
Corrected escapement in pounds	2,197,480 (tons * 2,000)			

Table 2. Southeast Alaska herring spawn deposition surveys results, 1993 (cont.).

TENAKEE INLET AREA					
Number of estimates	222	RL	TM	WB	DI
Unadjusted sum of estimates by diver		326	364	1203	184
Corrected sum of estimates by diver		361.9	309.4	1203.0	184.0
Total number of eggs/.1meter quadrant (1,000s)	2,058				
Average length of transects in meters	74	(total samples * 5 meters / total [15] transects)			
Lineal meters of shoreline receiving spawn	11,853	(6.4 nautical miles of shore * 1852 meters/nmile)			
Area of survey in square meters	877,107	(length of shoreline * average width of transects)			
Average density of quadrant samples (1,000s)	9.3	(total eggs[1,000s] / total number of observations)			
Average density of eggs per square meter	92,714	(average .1 meter quadrant sample*1,000 eggs*10 meters)			
Total number of eggs in survey area	81,320,480,427	(total survey area in meters * total eggs per meter)			
Unadjusted escapement estimate in tons	813	(total number of eggs / 100,000,000 eggs per ton of spawners)			
Corrected escapement using 10% egg loss	904	(adjustment to account for 10% egg loss prior to survey)			
Corrected escapement in pounds	1,807,122	(tons * 2,000)			
LISIANSKI INLET AND STRAIT AREA					
Number of estimates	139	RL	TM		
Unadjusted sum of estimates by diver		775	594		
Corrected sum of estimates by diver		860.3	504.9		
Total number of eggs/.1meter quadrant (1,000s)	1,365				
Average length of transects in meters	50	(total samples * 5 meters / total [14] transects)			
Lineal meters of shoreline receiving spawn	9,630	(5.2 nautical miles of shore * 1852 meters / nmile)			
Area of survey in square meters	478,081	(length of shoreline * average width of transects)			
Average density of quadrant samples (1,000s)	9.8	(total eggs[1,000s] / total number of observations)			
Average density of eggs per square meter	98,212	(average .1 meter quadrant sample * 1,000 eggs * 10 meters)			
Total number of eggs in survey area	46,953,359,143	(total survey area in meters * total eggs per meter)			
Unadjusted escapement estimate in tons	470	(total number of eggs / 100,000,000 eggs per ton of spawners)			
Corrected escapement using 10% egg loss	522	(adjustment to account for 10% egg loss prior to survey)			
Corrected escapement in pounds	1,043,408	(tons * 2,000)			

Table 3. Spawn deposition diver calibration estimates vs. laboratory analysis, 1993.

Area	Date	Transect #	Observer	Sub-strate	Visual Estimate	Lab Count	Lab/ Visual
Sitka	4/13/93	3	RL/BD	lbk	RL=225k	264,478	1.2
					BD=320K		0.8
Sitka	4/12/93	20	RL/BDJ	hair	RL=250k	449,357	1.8
			TM/BD		BD=320k		1.4
					TM=320k		1.4
					BDJ=360k		1.2
Sitka	4/12/93	1	RL/BD	lbk	RL=35k	33,930	1.0
					BD=25k		1.4
Sitka	4/13/93	3	RL/BD	lbk	RL=190k	141,181	0.7
					BD=200k		0.7
Sitka	4/12/93	4	TM	hair	TM=50k	83,776	1.7
Sitka	4/13/93	8	TM/BDJ	hair	TM=400k	447,784	1.1
BDJ=500k	0.9						
Sitka	4/12/93	2	TM	lbk	TM=70k	83,350	1.2
Sitka	4/13/93	8	TM	hair	TM=35k	29,916	0.9
Sitka	4/12/93	1	RL/BD	lbk	RL=17k	12,427	0.7
					BD=15k		0.8
Cat Is.	4/24/93	none	TM/BL	fucus	TM=90k	81,117	0.9
			PD/RL/TK		BL=40k		2.0
		cal. sample			PD=85k		1.0
					RL=45k		1.8
					TK=110k		0.7
W.Behm	4/25/93	14	PD/TK	fir	PD=140k	110,789	0.8
					TK=140k		0.8
W.Behm	4/25/93	8	TK/BL	fir	TK=60k	60,916	1.0
					BL=45k		1.4
W.Behm	4/25/93	14	PD/TK	fir	PD=10k	11,882	1.2
					TK=12k		1.0
Cat Is.	4/23/93	11	TM/BL	hair	TM=10k	9,560	1.0
					BL=12k		0.8
Cat Is.	4/24/93	none	TM/BL/PD		TM=110k	87,156	0.8
			RL/TK	fucus	BL=45k		1.9
		cal. sample			PD=95k		0.9
					RL=50k		1.7
					TK=80k		1.1
W. Behm	4/25/93	none	RL/TK	fucus/l	RL=2k	1,875	0.9
		cal sample			TK=1k		1.9
Cat Is.	4/24/93	none	TM/PD/BL	fir	TM=7k	5,604	0.8
			RL/TK		BL=4k		1.4
		cal. sample			PD=5k		1.1
					RL=5k		1.1
					TK=1k		5.6

Table 3. 1993 Spawn deposition diver calibration estimates vs. laboratory analysis (cont.).

Area	Date	Transect #	Observer	Sub-strate	Visual Estimate	Lab Count	Lab/ Visual
Cat Is.	4/24/93	none	TM/BL/PD	eel	TM=60k	46,043	0.8
			RL/TK	grass	BL=60k		0.8
		cal. sample			PD=60k		0.8
					RL=60k		0.8
					TK=65k		0.7
Seymour	5/11/93	5	BD/RL	lbk	BD=10k	15,454	1.5
					RL=12k		1.3
W. Behm	4/25/93	4	TM/PD	hair	TM=180k	264,886	1.5
					PD=145k		1.8
W. Behm	4/26/93	3	PD	fir	PD=165k	198,657	1.2
Cat Is.	4/24/93	none	TM/BL/PD	fucus	TM=30k	26,250	0.9
			RL/TK		BL=25k		1.1
cal. sample					PD=25k		1.1
					RL=22k		1.2
					TK=15k		1.8
Cat Is.	4/24/93	none	TM/BL/PD	eel gra	TM=6k	4,626	0.8
			RL/TK		BL=10k		0.5
		cal. sample			PD=10k		0.5
					RL=15k		0.3
					TK=15k		0.3
Cat Is.	4/24/93	none	RL/BL	fucus	RL=2	5,756	2.9
			PD/TK		BL=10k		0.6
		cal. sample			PD=10k		0.6
					TK=4k		1.4
W. Behm	4/25/93	4	TM/PD	hair	TM=10k	13,803	1.4
					PD=15k		0.9
Cat Is.	4/23/93	11	BL/TM	lbk	BL=25k	15,687	0.6
					TM=20k		0.8
W.Behm	4/25/93	8	TK/BL	fir	TK=90k	72,891	0.8
					BL=90k		0.8
W. Behm	4/26/93	3	PD/TM	lbk	PD=8k	8,657	1.1
					TM=8k		1.1
					RL=75k		3.2
Tenekee	5/07/93	5	BD/TM	hair	BD=9k	17,541	1.9
					TM=17k		1.0
Seymour	5/11/93	8	BD/RL	alaria	BD=100k	124,387	1.2
					RL=90k		1.4
Seymour	5/11/93	8	BD/RL	hair	BD=400k	542,551	1.4
					RL=500k		1.1
Seymour	4/10/93	16	WB/BD	fucus	WB=70k	86,400	1.2
					BD=70k		1.2
Tenekee	5/07/93	6	BD/TM	alaria	BD=13k	24,928	1.9
					TM=18k		1.4
Tenekee	5/08/93	12	WB/BD	fir/lbk	WB=220k	82,243	0.4
					BD=110k		0.7
Tenekee	5/07/93	7	BD/TM	hair	BD=33k	30,686	0.9
					TM=23k		1.3

Table 3. 1993 Spawn deposition diver calibration estimates vs. laboratory analysis (cont.).

Area	Date	Transect #	Observer	Sub-strate	Visual Estimate	Lab Count	Lab/ Visual
Tenekee	5/08/93	15	WB/BD	hair	WB=65k	57,477	0.9
					BD=65k		0.9
Seymour	5/10/93	16	WB/BD	fucus	WB=130k	162,375	1.2
					BD=150k		1.1
Seymour	5/11/93	5	BD/RL	lbk	BD=20k	27,634	*
					RL=22k		1.3
Vixen	4/29/93	11	WB/TM	hair	WB=172k	59,092	0.3
					TM=82k		0.7
Tenekee	5/07/93	4	BD/TM	fir	BD=2k	3,300	1.7
					TM=4k		0.8
Seymour	5/11/93	8	BD/RL	hair	BD=240k	190,001	0.8
					RL=75k		2.5
Tenekee	5/07/93	4	BD/TM	lbk	BD=17k	16,643	1.0
					TM=14k		1.2
Tenekee	5/08/93	none cal. sample	WB/BD	hair	WB=480k	506,521	1.1
					BD=380k		1.3
Tenekee	5/07/93	7	BD/TM	hair	BD=9k	6,841	0.8
					TM=6k		1.1

INDIVIDUAL DIVER CALIBRATIONS 1993

Observer	No Estimates	Visual est	Lab count	Lab/Visual
R. Larson	18	1617000	2059827	1.3
T. Minicucci	23	1570000	1816603	1.2
B. Davidson	21	2508000	2796355	1.1
B. DeJong	2	860000	897141	1.0
P. Doherty	13	773000	865226	1.1
W. Bergmann	6	1137000	954108	0.8
T. Koeneman	12	593000	514905	0.9
B. Lynch	11	366000	415309	1.1

Table 4. Calibration samples for spawn deposition study.

1982 to 1993 Combined

DIVER	SUBSTRATE	LAB COUNT	VISUAL ESTIMATE	RATIO
Bergmann	EG	163.50	210.70	0.78
Bergmann	F	103.80	84.21	1.23
Bergmann	H	192.70	161.70	1.19
Bergmann	LBK	65.51	73.99	0.89
Bergmann	other	97.45	89.14	1.09
Total number of samples=206		Total correction ratio=1.00		
DeJong	EG	155.80	164.50	0.95
DeJong	F	100.20	100.80	0.99
DeJong	H	190.10	185.30	1.03
DeJong	LBK	78.16	82.38	0.95
DeJong	other	115.30	96.87	1.19
Total number of samples=152		Total correction ratio=1.03		
Doherty	EG	108.90	83.09	1.31
Doherty	F	92.55	94.79	0.98
Doherty	H	144.10	132.50	1.09
Doherty	LBK	28.87	27.06	1.07
Doherty	other	63.68	51.15	1.25
Total number of samples=119		Total correction ratio=1.19		
Koeneman	EG	108.50	142.60	0.76
Koeneman	F	41.39	57.74	0.72
Koeneman	H	130.70	148.90	0.88
Koeneman	LBK	41.13	44.19	0.93
Koeneman	other	142.80	147.50	0.97
Total number of samples=156		Total correction ratio=.86		
Larson	EG	104.40	101.50	1.03
Larson	F	111.30	103.00	1.08
Larson	H	263.40	200.70	1.31
Larson	LBK	55.29	51.11	1.08
Larson	other	99.83	94.16	1.06
Total number of samples=281		Total correction ratio=1.11		
Minicucci	EG	137.40	111.10	1.24
Minicucci	F	125.90	111.20	1.13
Minicucci	H	190.00	153.70	1.24
Minicucci	LBK	51.87	62.65	0.83
Minicucci	other	78.60	75.86	1.04
Total number of samples=166		Total correction ratio=.85		

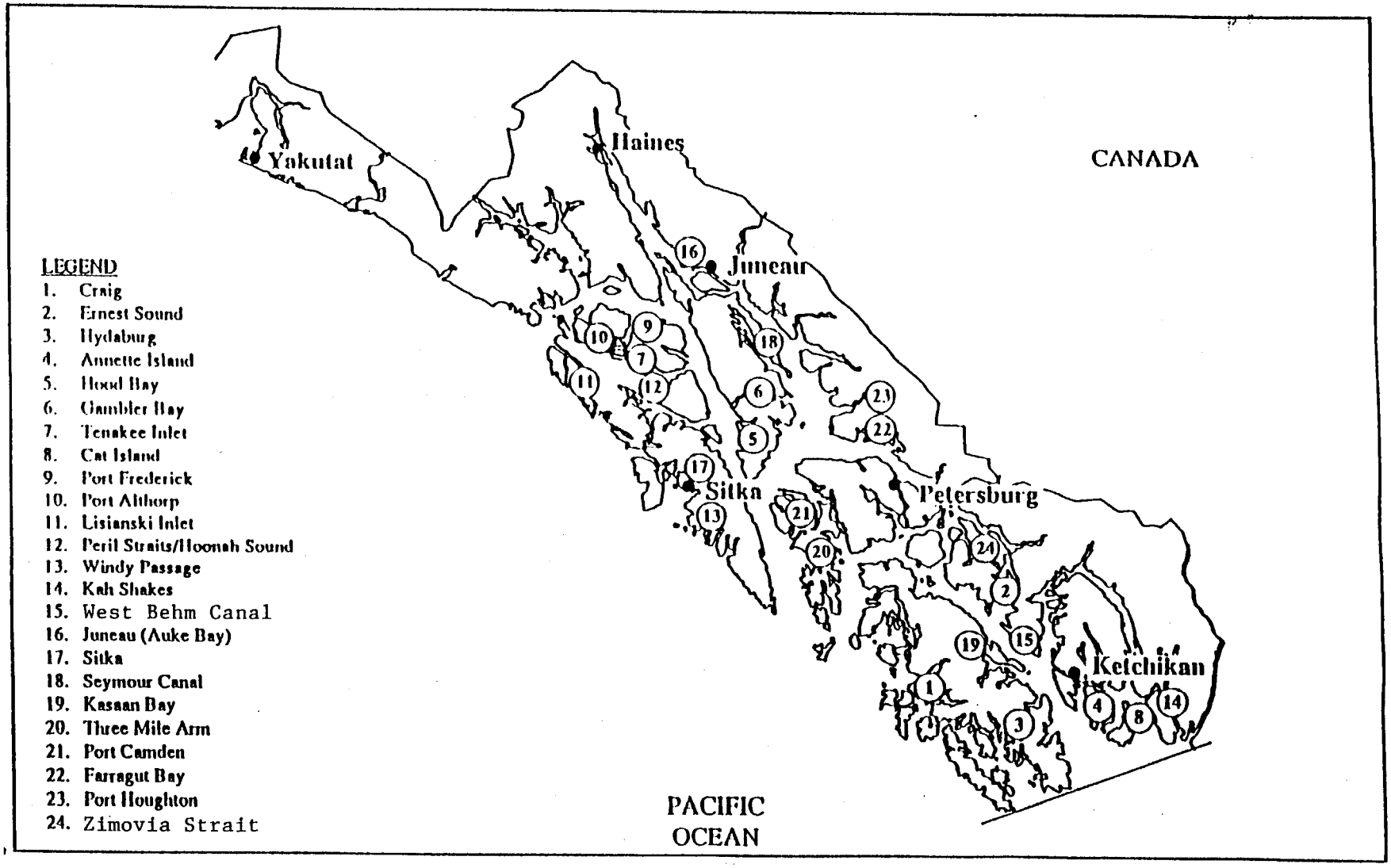
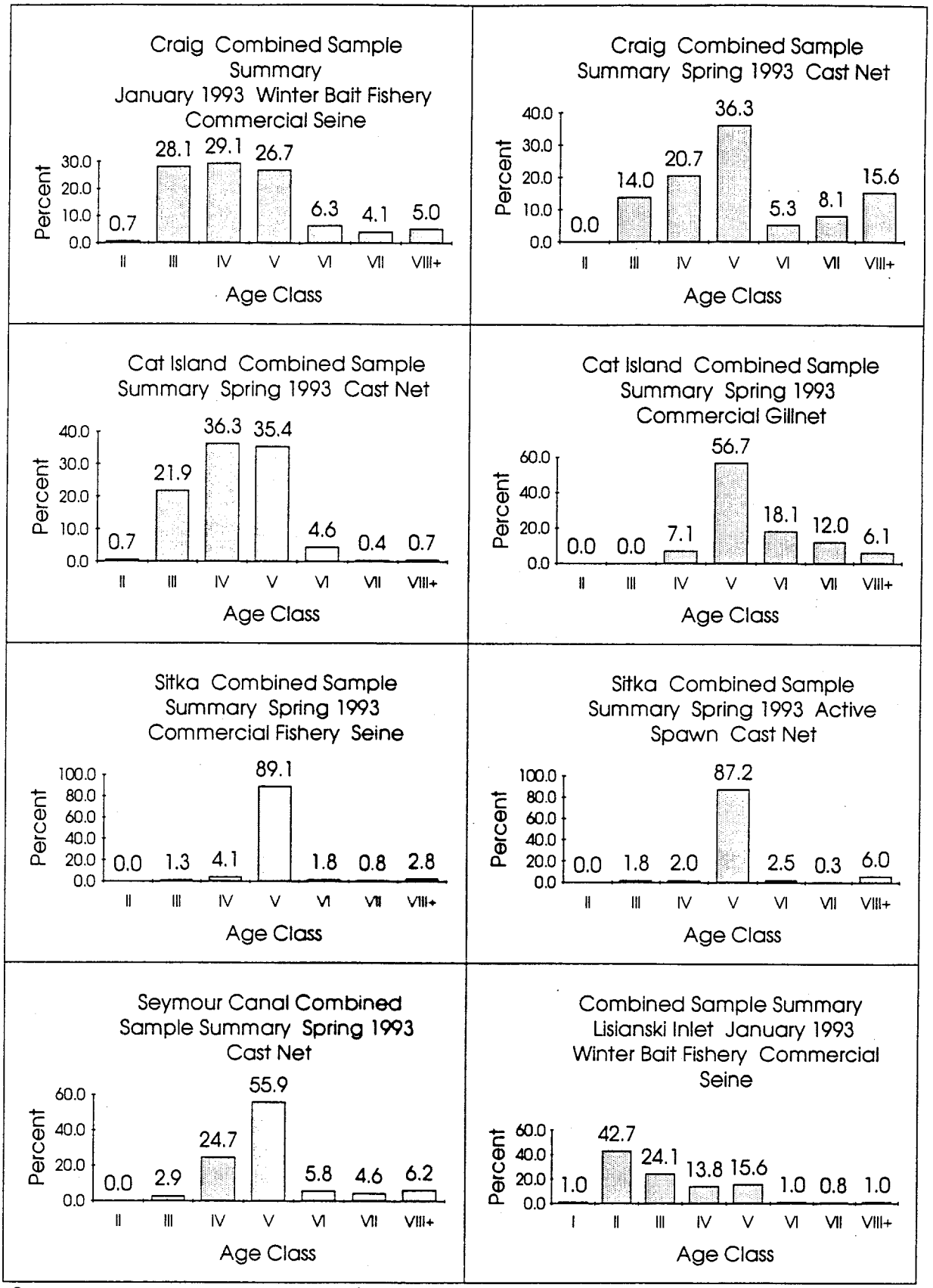


Figure 1. Southeast Alaska herring project study area, 1993.



Summary age compositions from 1993 herring samples

Figure 2. Summary of age compositions from 1993 herring samples.

APPENDIX A

Herring age, sex and size samples, 1993

HERRING AGE, SEX AND SIZE SAMPLES 1993

CAT ISLAND

Cat Island (West Side) April 3, 1993 Non-Active Spawn Cast Net

Age Class	n	%	Mean Length (mm)	Std. Dev.	Mean Weight (g)	Std. Dev.	% Males
II	1	0.7	154.0	0.0	49.0	0.0	0.0
III	17	11.7	180.1	7.9	80.4	11.3	58.8
IV	63	43.4	192.4	5.8	97.7	11.3	49.2
V	51	35.2	205.8	7.3	122.5	14.3	43.1
VI	13	9.0	221.8	5.4	150.2	12.2	69.2
VII	0	0.0	0.0	0.0	0.0	0.0	0.0
VIII+	0	0.0	0.0	0.0	0.0	5.0	0.0
Totals:	145	100	198.1	13.4	108.8	23.4	49.7
Total Sample: n: 147 % Males: 49.7 % R,N/S: 1.4							

Mary Island (S.W. Side) March 29, 1993 Active Spawn Cast Net

Age Class	n	%	Mean Length (mm)	Std. Dev.	Mean Weight (g)	Std. Dev.	% Males
II	0	0.0	0.0	0.0	0.0	0.0	0.0
III	23	25.3	179.3	13.5	80.7	22.7	34.8
IV	31	34.1	187.0	10.6	94.1	23.9	64.5
V	30	33.0	193.1	9.0	99.6	14.6	50.0
VI	3	3.3	200.7	21.9	120.0	41.7	0.0
VII	2	2.2	212.5	8.5	144.0	5.0	50.0
VIII+	2	2.2	225.5	7.5	165.5	20.5	0.0
Totals:	91	100	188.9	14.3	96.0	26.5	48.4
Total Sample: n: 105 % Males: 49.5 % R,N/S: 13.3							

North Dog Island April 10, 1993 Active Spawn Cast Net

Age Class	n	%	Mean Length (mm)	Std. Dev.	Mean Weight (g)	Std. Dev.	% Males
II	2	1.8	140.0	2.0	32.0	3.0	100.0
III	36	31.6	175.8	8.3	67.5	12.5	55.6
IV	39	34.2	186.9	6.9	81.3	12.6	64.1
V	37	32.5	195.4	9.4	94.3	17.4	48.6
VI	0	0.0	0.0	0.0	0.0	0.0	0.0
VII	0	0.0	0.0	0.0	0.0	0.0	0.0
VIII+	0	0.0	0.0	0.0	0.0	0.0	0.0
Totals:	114	100	185.3	12.8	80.3	18.9	57.0
Total Sample: n: 117 % Males: 56.4 % R: 2.6							

North Double Island April 10, 1993 Active Spawn Cast Net

Age Class	n	%	Mean Length (mm)	Std. Dev.	Mean Weight (g)	Std. Dev.	% Males
II	0	0.0	0.0	0.0	0.0	0.0	0.0
III	24	22.4	176.3	5.9	64.7	7.4	54.2
IV	33	30.8	187.0	5.0	77.3	10.9	66.7
V	44	41.1	198.0	9.2	92.1	14.2	61.4
VI	5	4.7	204.8	9.5	100.4	14.4	60.0
VII	0	0.0	0.0	0.0	0.0	0.0	0.0
VIII+	1	0.9	205.0	0.0	90.0	0.0	0.0
Totals:	107	100	190.1	11.7	81.8	16.6	60.7
Total Sample: n: 110 % Males: 60.0 % N/S,R: 2.7							

Cat Island Combined Sample Summary Spring 1993 Cast Net

Age Class	n	%	Mean Length (mm)	Std. Dev.	Mean Weight (g)	Std. Dev.	% Males
II	3	0.7	144.7	6.8	37.7	8.4	66.7
III	100	21.9	177.2	9.4	71.8	16.1	51.0
IV	166	36.3	189.0	7.5	89.1	17.1	59.0
V	162	35.4	199.0	10.0	103.6	20.0	50.6
VI	21	4.6	214.8	13.8	134.0	29.1	57.1
VII	2	0.4	212.5	8.5	144.0	5.0	50.0
VIII+	3	0.7	218.7	11.4	140.3	39.3	0.0
Totals:	457	100	191.2	14.0	92.8	24.9	53.8
Total Sample: n: 479 % Males: 53.7 % R,N/S: 19.6							

Mary Island (s.w. side) March 30, 1993 Pre-fishery Commercial Gillnet Sample

Age Class	n	%	Mean Length (mm)	Std. Dev.	Mean Weight (g)	Std. Dev.	% Males
II	0	0.0	0.0	0.0	0.0	0.0	0.0
III	0	0.0	0.0	0.0	0.0	0.0	0.0
IV	4	6.9	206.3	7.6	114.5	11.5	50.0
V	30	51.7	216.1	10.2	127.4	17.4	43.3
VI	15	25.9	223.5	6.7	132.1	12.4	46.7
VII	6	10.3	229.5	6.6	127.0	57.4	16.7
VIII+	3	5.2	232.0	4.9	132.0	4.3	33.3
Totals:	58	100	219.6	10.8	127.9	23.8	41.4
Total Sample: n: 60 % Males: 40.0 % R: 3.3							

Mary Island (s.w. tip) March 30, 1993 Pre-Fishery Commercial Gillnet Sample

Age Class	n	%	Mean Length (mm)	Std. Dev.	Mean Weight (g)	Std. Dev.	% Males
II	0	0.0	0.0	0.0	0.0	0.0	0.0
III	0	0.0	0.0	0.0	0.0	0.0	0.0
IV	10	9.7	205.1	6.0	120.4	10.6	20.0
V	58	56.3	213.3	7.2	130.7	11.4	27.6
VI	18	17.5	218.8	9.3	139.4	15.3	27.8
VII	11	10.7	226.5	10.2	152.5	15.2	45.5
VIII+	6	5.8	227.5	6.7	150.0	12.2	50.0
Totals:	103	100	215.7	9.9	134.7	15.4	30.1
Total Sample: n: 117 % Males: 29.9 % R, N/S:12.0							

North Double Island April 10, 1993 Commercial Gillnet

Age Class	n	%	Mean Length (mm)	Std. Dev.	Mean Weight (g)	Std. Dev.	% Males
II	0	0.0	0.0	0.0	0.0	0.0	0.0
III	0	0.0	0.0	0.0	0.0	0.0	0.0
IV	9	6.3	198.3	3.4	112.1	11.0	55.6
V	86	60.6	207.1	23.6	122.5	18.1	37.2
VI	21	14.8	219.6	8.4	139.2	14.5	33.3
VII	17	12.0	222.5	8.0	140.8	16.6	70.6
VIII+	9	6.3	223.7	11.2	150.0	21.7	55.6
Totals:	142	100	211.3	20.5	128.3	20.1	43.0
Total Sample: n: 154 % Males: 44.2 % R, N/S: 7.8							

North Dog Island April 10, 1993 Commercial Gillnet

Age Class	n	%	Mean Length (mm)	Std. Dev.	Mean Weight (g)	Std. Dev.	% Males
II	0	0.0	0.0	0.0	0.0	0.0	0.0
III	0	0.0	0.0	0.0	0.0	0.0	0.0
IV	7	5.7	207.4	10.5	127.7	13.9	28.6
V	67	54.9	213.3	6.9	128.0	13.6	34.3
VI	23	18.9	219.7	6.6	139.2	12.0	39.1
VII	17	13.9	224.0	7.1	147.1	14.8	47.1
VIII+	8	6.6	224.6	4.7	151.6	17.9	37.5
Totals:	122	100	216.4	8.6	134.3	16.2	36.9
Total Sample: n: 138 % Males: 35.5 % R, N/S: 11.6							

Cat Island Combined Sample Summary Spring 1993 Commercial Gillnet

Age Class	n	%	Mean Length (mm)	Std. Dev.	Mean Weight (g)	Std. Dev.	% Males
II	0	0.0	0.0	0.0	0.0	0.0	0.0
III	0	0.0	0.0	0.0	0.0	0.0	0.0
IV	30	7.1	203.8	7.9	118.8	13.1	36.7
V	241	56.7	211.5	15.8	126.6	15.7	34.9
VI	77	18.1	220.2	8.0	137.9	13.9	36.4
VII	51	12.0	224.7	8.4	143.8	25.7	51.0
VIII+	26	6.1	225.8	8.4	148.4	18.3	46.2
Totals:	425	100	215.0	14.5	131.5	18.8	37.9
Total Sample: n: 469 % Males: 37.5 % R,N/S: 9.4							

CRAIG

Warm Chuck Inlet January 14,1993 Winter Bait Fishery Commercial Seine

Age Class	n	%	Mean Length (mm)	Std. Dev.	Mean Weight (g)	Std. Dev.	% Males
II	3	1.3	149.0	8.6	37.0	4.9	33.3
III	79	35.4	171.5	9.7	65.7	13.8	34.2
IV	74	33.2	183.1	10.0	82.5	16.9	37.8
V	46	20.6	192.0	11.5	96.8	20.4	45.7
VI	10	4.5	192.5	10.1	98.4	19.1	50.0
VII	5	2.2	204.6	5.1	116.6	10.4	20.0
VIII+	6	2.7	219.8	9.4	150.7	21.5	50.0
Totals:	223	100	182.3	15.2	82.2	24.8	38.6
Total Sample: n: 232 % Males: 38.8 % R,N/S: 3.9							

Bocas de Finas January 16, 1993 Winter Bait Fishery Commercial Seine

Age Class	n	%	Mean Length (mm)	Std. Dev.	Mean Weight (g)	Std. Dev.	% Males
II	0	0.0	0.0	0.0	0.0	0.0	0.0
III	38	19.7	176.9	8.8	69.3	12.4	44.7
IV	47	24.4	192.6	9.3	90.9	15.3	25.5
V	65	33.7	200.0	10.3	104.0	17.8	36.9
VI	16	8.3	209.9	5.3	118.1	12.0	37.5
VII	12	6.2	216.8	8.3	135.3	16.4	25.0
VIII+	15	7.8	224.3	11.2	151.7	21.0	26.7
Totals:	193	100	197.4	16.5	100.8	27.9	34.2
Total Sample: n: 204 % Males: 34.3 % R: 5.4							

Craig Combined Sample Summary
January 1993 Winter Bait Fishery Commercial Seine

Age Class	n	%	Mean Length (mm)	Std. Dev.	Mean Weight (g)	Std. Dev.	% Males
II	3	0.7	149.0	8.6	37.0	4.9	33.3
III	117	28.1	173.3	9.8	66.9	13.5	37.6
IV	121	29.1	186.8	10.8	85.7	16.8	33.1
V	111	26.7	196.7	11.5	101.0	19.3	40.5
VI	26	6.3	203.2	11.3	110.5	17.9	42.3
VII	17	4.1	213.2	9.3	129.8	17.2	23.5
VIII+	21	5.0	223.0	10.9	151.4	21.2	33.3
Totals:	416	100	189.3	17.5	90.8	27.9	36.5
Total Sample: n: 436 % Males: 36.7 % R's, N/S: 4.6							

Alberto Islands April 14, 1993 Pre-Pound Fishery Test Seine F/V Sandie Rae

Age Class	n	%	Mean Length (mm)	Std. Dev.	Mean Weight (g)	Std. Dev.	% Males
II	0	0.0	0.0	0.0	0.0	0.0	0.0
III	37	24.0	171.5	11.0	63.4	15.0	51.4
IV	32	20.8	178.0	33.5	75.9	19.5	53.1
V	50	32.5	199.1	11.5	101.6	18.4	58.0
VI	13	8.4	211.0	7.4	124.9	16.7	30.8
VII	7	4.5	210.3	9.5	126.9	20.2	42.9
VIII+	15	9.7	216.2	10.8	134.9	21.6	60.0
Totals:	154	100	191.2	24.2	93.4	30.6	52.6
Total Sample: n: 156 % Males: 52.6 % R 1.3							

Fish Egg Island (west end) March 26, 1993 Active Spawn Cast Net

Age Class	n	%	Mean Length (mm)	Std. Dev.	Mean Weight (g)	Std. Dev.	% Males
II	0	0.0	0.0	0.0	0.0	0.0	0.0
III	12	10.6	171.2	7.7	57.8	12.0	58.3
IV	27	23.9	188.4	8.4	75.1	13.4	51.9
V	41	36.3	194.0	12.1	81.0	17.4	70.7
VI	9	8.0	206.3	13.4	100.6	22.8	77.8
VII	4	3.5	214.8	10.1	118.8	14.1	75.0
VIII+	20	17.7	224.0	10.9	125.9	22.8	50.0
Totals:	113	100	197.3	18.8	87.9	27.6	61.9
Total Sample: n: 167 # Males: 103 % Males: 61.7 % R: 0.6							

Fish Egg Island (west end) March 27,1993 Active Spawn Cast Net

Age Class	n	%	Mean Length (mm)	Std. Dev.	Mean Weight (g)	Std. Dev.	% Males
II	0	0.0	0.0	0.0	0.0	0.0	0.0
III	5	8.6	178.0	6.0	62.8	6.7	60.0
IV	8	13.8	191.0	7.3	79.9	12.9	75.0
V	27	46.6	201.7	8.3	99.3	18.1	25.9
VI	0	0.0	0.0	0.0	0.0	0.0	0.0
VII	7	12.1	214.0	8.8	115.7	13.3	71.4
VIII+	11	19.0	226.6	8.2	141.4	12.9	63.6
Totals:	58	100	204.4	16.0	103.4	27.4	48.3
Total Sample: n: 152 # Males: 85 % Males: 55.9 % R: 1.3							

Fish Egg Island (north end) March 29, 1993 Active Spawn Cast Net

Age Class	n	%	Mean Length (mm)	Std. Dev.	Mean Weight (g)	Std. Dev.	% Males
II	0	0.0	0.0	0.0	0.0	0.0	0.0
III	7	9.7	169.4	9.2	53.0	5.7	57.1
IV	9	12.5	184.2	11.1	76.7	18.3	66.7
V	22	30.6	201.0	10.5	100.0	18.6	68.2
VI	7	9.7	214.0	6.8	125.9	25.5	57.1
VII	11	15.3	222.5	8.0	135.8	17.7	63.6
VIII+	16	22.2	219.7	4.3	138.8	14.9	56.3
Totals:	72	100	204.5	19.0	109.1	33.3	62.5
Total Sample: n: 162 % Males: 62.3 % R: 3.1							

Crab Bay April 1, 1993 Active Spawn Cast Net

Age Class	n	%	Mean Length (mm)	Std. Dev.	Mean Weight (g)	Std. Dev.	% Males
II	0	0.0	0.0	0.0	0.0	0.0	0.0
III	4	6.9	169.3	6.2	56.5	7.5	75.0
IV	11	19.0	187.8	9.3	72.7	7.7	81.8
V	26	44.8	197.7	9.9	90.4	16.6	73.1
VI	4	6.9	203.3	9.0	105.0	18.1	100.0
VII	3	5.2	214.0	9.3	122.3	7.9	66.7
VIII+	10	17.2	224.0	7.5	133.0	17.7	60.0
Totals:	58	100	199.6	17.0	94.7	26.8	74.1
Total Sample: n: 152 % Males: 65.8 % R: 1.3							

Abbess Island (north end) April 17, 1993 Active Spawn Cast Net

Age Class	n	%	Mean Length (mm)	Std. Dev.	Mean Weight (g)	Std. Dev.	% Males
II	0	0.0	0.0	0.0	0.0	0.0	0.0
III	16	26.2	175.7	10.6	61.0	12.2	75.0
IV	15	24.6	175.0	47.7	67.4	21.3	53.3
V	16	26.2	197.8	7.8	81.6	10.5	87.5
VI	1	1.6	194.0	0.0	86.0	0.0	0.0
VII	7	11.5	212.7	8.1	102.6	10.7	85.7
VIII+	6	9.8	222.3	9.7	130.7	23.1	83.3
Totals:	61	100	190.5	30.1	80.0	26.3	73.8
Total Sample: n: 204 % Males: 70.1 % R: 1.5							

Fern Point (San Fernando Island) April 19, 1993 Active Spawn Cast Net

Age Class	n	%	Mean Length (mm)	Std. Dev.	Mean Weight (g)	Std. Dev.	% Males
II	0	0.0	0.0	0.0	0.0	0.0	0.0
III	16	23.5	173.5	7.6	57.0	10.1	81.3
IV	19	27.9	186.6	7.6	70.4	7.9	57.9
V	24	35.3	199.0	10.2	91.2	17.7	54.2
VI	2	2.9	202.0	11.0	108.5	20.5	0.0
VII	3	4.4	212.0	16.8	105.3	25.6	33.3
VIII+	4	5.9	215.3	3.1	125.5	18.4	75.0
Totals:	68	100	191.1	15.5	80.5	24.1	60.3
Total Sample: n: 192 % Males: 65.6 % R: 2.6							

Craig Combined Sample Summary Spring 1993 Cast Net

Age Class	n	%	Mean Length (mm)	Std. Dev.	Mean Weight (g)	Std. Dev.	% Males
II	0	0.0	0.0	0.0	0.0	0.0	0.0
III	60	14.0	173.2	8.9	58.2	10.7	70.0
IV	89	20.7	185.5	21.7	73.1	14.6	60.7
V	156	36.3	198.1	10.6	90.1	18.7	62.2
VI	23	5.3	207.2	11.7	109.1	25.2	65.2
VII	35	8.1	216.3	10.5	119.4	20.1	71.4
VIII+	67	15.6	222.7	8.8	133.0	19.7	59.7
Totals:	430	100	197.8	20.6	92.2	29.8	63.5
Total Sample: n: 1029 # Males: 659 % Males: 64.0 % R,N/S: 1.7							

SITKA SOUND

Eastern Channel January 26, 1993 Test Seine (40 ton set) F/V Lisa Jean

Age Class	n	%	Mean Length (mm)	Std. Dev.	Mean Weight (g)	Std. Dev.	% Males
I	1	0.6	107	0.0	13	0.0	0.0
II	5	3.0	154.0	7.6	39.2	6.9	0.0
III	10	6.1	175.2	12.6	65.0	13.8	30.0
IV	4	2.4	192.8	4.0	87.5	8.0	75.0
V	134	81.7	198.9	7.8	97.8	13.2	53.0
VI	6	3.7	204.2	7.5	103.2	16.8	50.0
VII	1	0.6	192.0	0.0	91.0	0.0	100.0
VIII+	3	1.8	223.7	9.5	141.7	22.4	33.3
Totals:	164	100	196.0	14.7	94.2	20.4	50.0
Total Sample: n: 166 % Males: 50.0 % R: 1.2							

Necker Bay January 26, 1993 Commercial Seine (75 ton set) Winter Bait Fishery

Age Class	n	%	Mean Length (mm)	Std. Dev.	Mean Weight (g)	Std. Dev.	% Males
II	17	13.5	147.4	12.2	37.1	11.5	23.5
III	20	15.9	173.5	11.2	60.6	14.2	40.0
IV	14	11.1	183.9	10.3	74.2	14.3	50.0
V	67	53.2	199.1	8.9	98.6	13.4	67.2
VI	2	1.6	213.0	3.0	119.5	0.5	50.0
VII	0	0.0	0.0	0.0	0.0	0.0	0.0
VIII+	6	4.8	225.2	7.1	148.5	19.0	66.7
Totals:	126	100	187.8	22.3	84.3	30.2	54.8
Total Sample: n: 148 % Males: 55.4 % R, N/S: 14.9							

Eastern Channel February 7, 1993 Personal Use/Seine (120 ton set)

Age Class	n	%	Mean Length (mm)	Std. Dev.	Mean Weight (g)	Std. Dev.	% Males
II	7	5.3	151.0	5.1	35.4	4.7	0.0
III	1	0.8	182.0	0.0	62.0	0.0	0.0
IV	6	4.5	193.3	8.9	87.5	12.8	50.0
V	113	85.0	198.6	8.6	92.8	16.2	55.8
VI	4	3.0	201.8	8.4	100.8	12.5	75.0
VII	0	0.0	0.0	0.0	0.0	0.0	0.0
VIII+	2	1.5	207.5	5.5	108.0	2.0	0.0
Totals:	133	100	196.0	13.7	89.8	20.3	51.9
Total Sample: n: 137 % Males: 52.6 % R: 2.9							

March 27, 1993 Commercial Seine F/V Aleutian Spirit

Age Class	n	%	Mean Length (mm)	Std. Dev.	Mean Weight (g)	Std. Dev.	% Males
II	0	0.0	0.0	0.0	0.0	0.0	0.0
III	1	0.8	180.0	0.0	62.0	0.0	0.0
IV	5	4.0	191.2	7.0	84.2	7.7	60.0
V	112	88.9	198.3	7.7	91.1	16.2	50.9
VI	3	2.4	206.3	7.0	107.3	11.1	0.0
VII	2	1.6	210.5	2.5	108.0	0.0	100.0
VIII+	3	2.4	219.0	10.7	135.3	15.4	66.7
Totals:	126	100	198.8	8.8	92.3	17.5	50.8
Total Sample: n: 131 % Males: 50.4 %R,N/S: 3.8							

March 31, 1993 Commercial Seine F/V Shady Lady

Age Class	n	%	Mean Length (mm)	Std. Dev.	Mean Weight (g)	Std. Dev.	% Males
II	0	0.0	0.0	0.0	0.0	0.0	0.0
III	3	2.2	178.0	5.1	65.3	4.2	33.3
IV	3	2.2	186.0	4.5	72.0	11.0	100.0
V	127	92.0	198.8	17.7	97.7	13.3	49.6
VI	2	1.4	201.0	5.0	93.5	6.5	0.0
VII	1	0.7	219.0	0.0	129.0	0.0	100.0
VIII+	2	1.4	222.5	9.5	144.5	20.5	50.0
Totals:	138	100	198.6	17.7	97.2	15.7	50.0
Total Sample: n: 146 % Males: 48.6 %R,N/S: 5.5							

April 3, 1993 Commercial Seine F/V Mitkof

Age Class	n	%	Mean Length (mm)	Std. Dev.	Mean Weight (g)	Std. Dev.	% Males
II	0	0.0	0.0	0.0	0.0	0.0	0.0
III	1	0.8	190.0	0.0	64.0	0.0	100.0
IV	8	6.5	192.8	7.1	81.9	17.0	50.0
V	106	86.2	198.6	8.3	92.4	15.2	50.9
VI	2	1.6	205.0	2.0	99.5	0.5	50.0
VII	0	0.0	0.0	0.0	0.0	0.0	0.0
VIII+	6	4.9	219.7	12.7	135.0	24.0	66.7
Totals:	123	100	199.3	9.7	93.7	18.7	52.0
Total Sample: n: 133 % Males: 50.4 %R,N/S: 7.5							

Sitka Combined Sample Summary Spring 1993 Commercial Fishery Seine

Age Class	n	%	Mean Length (mm)	Std. Dev.	Mean Weight (g)	Std. Dev.	% Males
II	0	0.0	0.0	0.0	0.0	0.0	0.0
III	5	1.3	180.8	6.1	64.4	3.5	40.0
IV	16	4.1	191.0	7.1	80.8	14.3	62.5
V	345	89.1	198.6	12.5	93.9	15.1	50.4
VI	7	1.8	204.4	5.9	101.1	9.9	14.3
VII	3	0.8	213.3	4.5	115.0	9.9	100.0
VIII+	11	2.8	220.0	11.7	136.8	21.6	63.6
Totals:	387	100	198.9	12.9	94.5	17.4	50.9
Total Sample: n: 410 % Males: 49.8 %R,N/S: 5.6							

Sitka Halibut Point March 27, 1993 Active Spawn Cast Net

Age Class	n	%	Mean Length (mm)	Std. Dev.	Mean Weight (g)	Std. Dev.	% Males
II	0	0.0	0.0	0.0	0.0	0.0	0.0
III	1	0.9	189.0	0.0	71.0	0.0	0.0
IV	3	2.8	198.0	4.2	82.7	3.3	66.7
V	91	85.8	203.1	7.0	95.0	12.4	63.7
VI	4	3.8	212.8	7.4	106.8	12.9	50.0
VII	0	0.0	0.0	0.0	0.0	0.0	0.0
VIII+	7	6.6	226.1	7.9	142.6	22.4	71.4
Totals:	106	100	204.7	9.4	98.0	18.1	63.2
Total Sample: n: 109 % Males: 63.3 % R: 2.8							

Sitka Kasiana Island March 27, 1993 Active Spawn Cast Net

Age Class	n	%	Mean Length (mm)	Std. Dev.	Mean Weight (g)	Std. Dev.	% Males
II	0	0.0	0.0	0.0	0.0	0.0	0.0
III	0	0.0	0.0	0.0	0.0	0.0	0.0
IV	2	1.8	186.0	7.0	70.0	14.0	100.0
V	101	91.0	200.0	8.2	93.9	13.1	67.3
VI	1	0.9	208.0	0.0	95.0	0.0	0.0
VII	2	1.8	212.0	12.0	106.5	29.5	100.0
VIII+	5	4.5	217.4	12.5	129.2	20.5	40.0
Totals:	111	100	200.8	9.9	95.3	17.2	66.7
Total Sample: n: 114 % Males: 66.7 % R: 2.6							

Sitka Cascade Creek March 27, 1993 Active Spawn Cast Net

Age Class	n	%	Mean Length (mm)	Std. Dev.	Mean Weight (g)	Std. Dev.	% Males
II	0	0.0	0.0	0.0	0.0	0.0	0.0
III	1	1.0	173.0	0.0	62.0	0.0	100.0
IV	0	0.0	0.0	0.0	0.0	0.0	0.0
V	89	88.1	201.0	7.4	96.7	14.9	65.2
VI	1	1.0	203.0	0.0	90.0	0.0	100.0
VII	0	0.0	0.0	0.0	0.0	0.0	0.0
VIII+	10	9.9	219.7	11.4	125.9	13.3	70.0
Totals:	101	100	202.6	10.1	99.2	17.4	66.3
Total Sample: n: 102 % Males: 65.7 % R: 1.0							

"The Cove" March 28, 1993 Active Spawn Cast Net

Age Class	n	%	Mean Length (mm)	Std. Dev.	Mean Weight (g)	Std. Dev.	% Males
II	0	0.0	0.0	0.0	0.0	0.0	0.0
III	1	1.1	185.0	0.0	74.0	0.0	100.0
IV	3	3.3	198.3	2.9	86.7	3.4	100.0
V	80	88.9	197.3	8.8	86.2	15.1	62.5
VI	1	1.1	200.0	0.0	81.0	0.0	100.0
VII	0	0.0	0.0	0.0	0.0	0.0	0.0
VIII+	5	5.6	217.4	12.0	122.8	21.4	60.0
Totals:	90	100	198.4	10.0	88.1	17.4	64.4
Total Sample: n: 93 % Males: 65.6 % R: 3.2							

Sandy Bay April 1, 1993 Active Spawn Cast Net

Age Class	n	%	Mean Length (mm)	Std. Dev.	Mean Weight (g)	Std. Dev.	% Males
II	0	0.0	0.0	0.0	0.0	0.0	0.0
III	6	4.8	177.7	5.6	63.5	8.1	66.7
IV	3	2.4	190.0	2.2	75.3	12.0	100.0
V	103	83.1	198.5	7.5	90.2	12.5	71.8
VI	5	4.0	202.2	4.4	92.0	7.6	40.0
VII	0	0.0	0.0	0.0	0.0	0.0	0.0
VIII+	7	5.6	221.1	7.2	127.7	14.0	100.0
Totals:	124	100	198.7	10.2	90.7	16.4	72.6
Total Sample: n: 128 % Males: 71.9 % R: 3.1							

Silver Point April 1, 1993 Active Spawn Cast Net

Age Class	n	%	Mean Length (mm)	Std. Dev.	Mean Weight (g)	Std. Dev.	% Males
II	0	0.0	0.0	0.0	0.0	0.0	0.0
III	2	3.1	180.5	2.5	61.0	2.0	100.0
IV	1	1.6	200.0	0.0	94.0	0.0	100.0
V	56	87.5	198.3	8.6	87.1	13.6	69.6
VI	3	4.7	198.0	10.4	87.0	14.4	100.0
VII	0	0.0	0.0	0.0	0.0	0.0	0.0
VIII+	2	3.1	214.5	6.5	117.0	2.0	50.0
Totals:	64	100	198.3	9.5	87.3	14.9	71.9
Total Sample: n: 67 % Males: 70.1 % R: 4.5							

Sitka Combined Sample Summary Spring 1993 Active Spawn Cast Net

Age Class	n	%	Mean Length (mm)	Std. Dev.	Mean Weight (g)	Std. Dev.	% Males
II	0	0.0	0.0	0.0	0.0	0.0	0.0
III	11	1.8	179.5	5.9	64.5	7.2	72.7
IV	12	2.0	194.3	6.5	80.7	11.2	91.7
V	520	87.2	199.8	8.2	91.9	14.4	66.7
VI	15	2.5	204.5	8.6	94.3	13.1	60.0
VII	2	0.3	212.0	12.0	106.5	29.5	100.0
VIII+	36	6.0	220.3	10.6	129.0	18.9	69.4
Totals:	596	100	200.7	10.2	93.5	17.6	67.4
Total Sample: n: 613 % Males: 67.2 % R: 2.8							

SEYMOUR CANAL

Seymour Canal April 28, 1993 Cast Net

Age Class	n	%	Mean Length (mm)	Std. Dev.	Mean Weight (g)	Std. Dev.	% Males
II	0	0.0	0.0	0.0	0.0	0.0	0.0
III	1	1.1	162.0	0.0	52.0	0.0	100.0
IV	16	17.0	177.1	46.8	88.3	36.1	31.3
V	61	64.9	196.7	10.0	100.9	20.6	49.2
VI	7	7.4	199.6	9.7	106.7	19.6	42.9
VII	3	3.2	224.3	12.5	142.3	26.4	33.3
VIII+	6	6.4	217.7	11.5	137.7	20.5	33.3
Totals:	94	100	195.4	24.3	102.3	27.8	44.7
Total Sample: n: 154 # Males: 83 % Males: 53.9 % R: 2.6							

Point Hugh April 29, 1993 Cast Net

Age Class	n	%	Mean Length (mm)	Std. Dev.	Mean Weight (g)	Std. Dev.	% Males
II	0	0.0	0.0	0.0	0.0	0.0	0.0
III	0	0.0	0.0	0.0	0.0	0.0	0.0
IV	20	29.4	178.9	11.4	73.0	17.0	65.0
V	39	57.4	190.0	14.8	91.2	24.0	69.2
VI	2	2.9	216.0	12.0	109.5	20.5	50.0
VII	4	5.9	200.8	17.4	105.8	38.0	75.0
VIII+	3	4.4	217.7	12.1	142.7	37.9	33.3
Totals:	68	100	189.4	17.0	89.5	28.4	66.2
Total Sample: n: 170 # Males: 106 % Males: 62.4 % R: 2.4							

Sorefinger Cove April 30, 1993 Cast Net

Age Class	n	%	Mean Length (mm)	Std. Dev.	Mean Weight (g)	Std. Dev.	% Males
II	0	0.0	0.0	0.0	0.0	0.0	0.0
III	5	5.6	160.4	8.1	51.0	6.9	40.0
IV	18	20.0	181.3	10.4	76.6	15.5	50.0
V	52	57.8	192.4	13.0	90.2	20.5	57.7
VI	5	5.6	195.6	14.4	103.2	22.8	40.0
VII	2	2.2	193.5	16.5	95.5	35.5	50.0
VIII+	8	8.9	219.9	11.2	150.5	27.6	50.0
Totals:	90	100	191.1	17.3	91.5	29.5	53.3
Total Sample: n: 92 % Males: 53.3 % R: 2.2							

Rockwall May 1, 1993 Cast Net

Age Class	n	%	Mean Length (mm)	Std. Dev.	Mean Weight (g)	Std. Dev.	% Males
II	0	0.0	0.0	0.0	0.0	0.0	0.0
III	3	6.3	159.7	9.0	45.3	6.6	66.7
IV	21	43.8	173.0	10.0	63.3	14.1	76.2
V	21	43.8	174.5	40.8	77.5	16.8	76.2
VI	2	4.2	197.0	4.0	94.0	9.0	50.0
VII	0	0.0	0.0	0.0	0.0	0.0	0.0
VIII+	1	2.1	231.0	0.0	122.0	0.0	100.0
Totals:	48	100	175.0	9.0	70.9	6.6	75.0
Total Sample: n: 51 % Males: 76.5 % R: 5.9							

Twin Islands May 2, 1993 Cast Net

Age Class	n	%	Mean Length (mm)	Std. Dev.	Mean Weight (g)	Std. Dev.	% Males
II	0	0.0	0.0	0.0	0.0	0.0	0.0
III	3	2.6	160.0	7.8	52.0	7.9	66.7
IV	28	23.9	179.8	12.2	74.3	16.6	60.7
V	60	51.3	189.7	12.9	86.0	19.4	51.7
VI	8	6.8	195.5	12.9	102.6	22.5	50.0
VII	10	8.5	202.1	14.9	105.0	21.0	50.0
VIII+	8	6.8	222.4	13.1	143.3	36.9	87.5
Totals:	117	100	190.3	17.3	89.0	27.5	56.4
Total Sample: n: 124 % Males: 57.3 % R: 5.6							

Seymour Canal Combined Sample Summary Spring 1993 Cast Net

Age Class	n	%	Mean Length (mm)	Std. Dev.	Mean Weight (g)	Std. Dev.	% Males
II	0	0.0	0.0	0.0	0.0	0.0	0.0
III	12	2.9	160.3	8.0	49.9	7.3	58.3
IV	103	24.7	178.1	21.3	74.4	21.7	58.3
V	233	55.9	190.8	18.1	90.9	21.7	57.5
VI	24	5.8	198.5	13.0	103.8	21.1	45.8
VII	19	4.6	204.4	17.8	110.1	31.3	52.6
VIII+	26	6.2	220.3	12.1	143.3	30.9	57.7
Totals:	417	100	189.7	21.5	90.5	28.7	56.8
Total Sample: n: 591 # Males: 348 % Males: 58.9 % R: 3.4							

LISIANSKI INLET

Junction Island (2 miles south of) January 14, 1993 Winter Bait Fishery
Commercial Seine F/V Osprey (150 ton set)

Age Class	n	%	Mean Length (mm)	Std. Dev.	Mean Weight (g)	Std. Dev.	%* Males
I	4	3.4	99.75	3.9	10	1.2	0.0
II	86	72.9	145.8	8.7	33.3	5.8	12.8
III	21	17.8	157.7	14.5	45.1	14.2	38.1
IV	2	1.7	151.5	3.5	40.5	8.5	0.0
V	5	4.2	189.4	3.5	80.2	2.6	20.0
VI	0	0.0	0.0	0.0	0.0	0.0	0.0
VII	0	0.0	0.0	0.0	0.0	0.0	0.0
VIII+	0	0.0	0.0	0.0	0.0	0.0	0.0
Totals:	118	100	148.3	16.3	36.7	13.7	16.9
Total Sample: n: 125 % Males: 16.8 * % UI: 64.8 %R, N/S: 5.6							

Cold Storage Sample January 1993 Winter Bait Fishery Commercial Seine

Age Class	n	%	Mean Length (mm)	Std. Dev.	Mean Weight (g)	Std. Dev.	% Males
II	0	0.0	0.0	0.0	0.0	0.0	0.0
III	42	32.8	168.5	8.4	64.5	11.1	35.7
IV	40	31.3	181.2	8.8	80.1	13.3	35.0
V	36	28.1	191.6	10.0	99.6	17.8	47.2
VI	4	3.1	194.3	16.2	106.8	29.9	50.0
VII	3	2.3	201.0	5.7	112.3	8.7	0.0
VIII+	3	2.3	223.7	15.5	155.7	33.3	33.3
Totals:	128	100	181.8	15.2	83.8	24.4	38.3

Total Sample: n: 157 % Males: 37.6 % R, N/S: 18.5

Junction Island (1/4 mile west of) January 12, 1993 Winter Bait Fishery
Commercial Seine F/V Chelsea Dawn (50 ton set)

Age Class	n	%	Mean Length (mm)	Std. Dev.	Mean Weight (g)	Std. Dev.	% * Males
II	84	55.3	145.9	5.9	34.2	4.2	9.5
III	33	21.7	157.4	14.2	44.6	13.5	18.2
IV	13	8.6	167.0	12.1	55.2	13.4	61.5
V	21	13.8	178.7	7.6	70.9	10.7	61.9
VI	0	0.0	0.0	0.0	0.0	0.0	0.0
VII	0	0.0	0.0	0.0	0.0	0.0	0.0
VIII+	1	0.7	211.0	0.0	94.0	0.0	100.0
Totals:	152	100	155.2	15.5	43.7	16.1	23.7

Total Sample: n: 156 % Males: 23.7 % *UI: 34.6 % R, N/S: 2.6

Combined Sample Summary
Lisianski Inlet January 1993 Winter Bait Fishery Commercial Seine

Age Class	n	%	Mean Length (mm)	Std. Dev.	Mean Weight (g)	Std. Dev.	% * Males
I	4	1.0	99.75	3.9	10	1.2	0.0
II	170	42.7	145.9	7.5	33.8	5.1	11.2
III	96	24.1	162.3	13.3	53.4	16.0	30.2
IV	55	13.8	176.7	12.3	72.8	18.0	40.0
V	62	15.6	187.0	10.7	88.3	20.2	50.0
VI	4	1.0	194.3	16.2	106.8	29.9	50.0
VII	3	0.8	201.0	5.7	112.3	8.7	0.0
VIII+	4	1.0	220.5	14.5	140.3	39.3	50.0
Totals:	398	100	161.7	21.1	54.6	27.6	26.4

Total Sample: n: 438 % Males: 26.5 % *UI: 30.8 % R, N/S: 9.1

ERNEST SOUND

Deer Island January 27, 1993 Winter Bait Fishery Commercial Seine

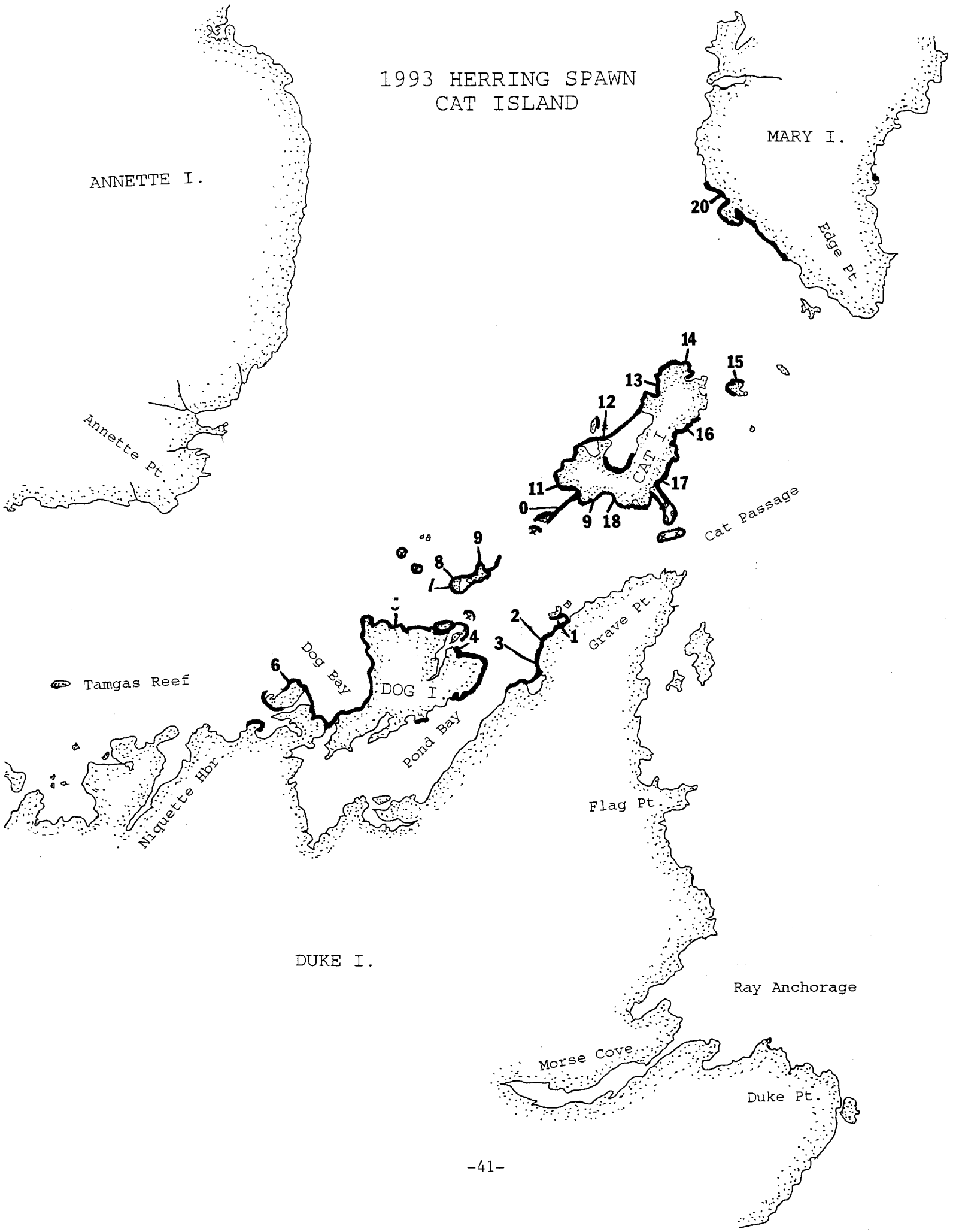
Age Class	n	%	Mean Length (mm)	Std. Dev.	Mean Weight (g)	Std. Dev.	% * Males
II	54	27.0	135.4	8.6	27.4	6.3	7.4
III	53	26.5	161.0	13.1	49.9	15.0	24.5
IV	31	15.5	181.7	10.0	73.5	13.0	48.4
V	25	12.5	192.4	11.4	93.6	17.8	48.0
VI	15	7.5	210.0	5.6	111.3	13.3	33.3
VII	18	9.0	216.2	8.0	126.4	18.1	33.3
VIII+	4	2.0	212.5	5.7	122.0	7.0	25.0
Totals:	200	100	170.9	29.7	65.9	36.1	28.0
Total Sample: n: 232 % Males: 28.0 % *UI: 16.8 % R,N/S: 13.8							

* R= Regenerated scales, N/S= No scales on fish, UI= unknown immature.

File: preawl.wq7

APPENDIX B

Herring spawn deposition survey raw data by area, 1993


1993 HERRING SPAWN
CAT ISLAND
ANNETTE I.
MARY I.
20
Edge Pt.
14
15
13
12
16
CAT I.
11
17
0
9
18
Cat Passage
Annette Pt.
9
8
2
1
Grave Pt.
4
3
6
Dog Bay
DOG I.
Tamgas Reef
Pond Bay
Niquette Hbr.
Flag Pt.
DUKE I.
Ray Anchorage
Morse Cove
Duke Pt.

CAT ISLAND HERRING SPAWN SURVEY 1993

DIVERS: Tim Minicucci(TM), Robert Larson(RL), Tim Koeneman(TK), Brian Lynch(BL), Phil Doherty(PD)

ABVS: Bottom Typ boulder=bld, cobble=cbl, fir=fir, gravel=gvl, mud=mud, mussels-mus, rock= rck, sand=snd, shell or shell hash=shl, woody debris=wdy

Veg. Type: alaria=ala, agarum=agm, coraline algae=cor, eelgrass=elg, fillamentous=fil, fucus=fuc, hairkelp=hir, laminaria=lam, large brown kelp=lbk, leafy red=red, loose=los, macrocystis=mac ulva=ulv

DATE	TRAN NO	TIME IN	TIME OUT	TOTAL TIME	MAX DEPT	DIVER NO.1	DIVER NO.2	INCREMENT (METERS)	DEPTH (FEET)	BOTTOM TYPE	VEG TYPE	TM EYE	TK EYE	RL EYE	PD EYE	COMMENTS
22-Apr-93	1	1350			12	TM	PD	5	0	rck		0				
									2	rck		0				
									4	rck	fuc	0				
									6	rck	fuc	0				
									8	rck	fuc	0				
									8	snd	fuc	0				
									8	snd		0				
									8	snd		0				
									6	snd		0				
									11	snd		0				
									12	snd		0				
									11	snd		0				
									9	snd		0				
22-Apr-93	2	1400	1451	51	38	RL	BL	5	3	cbl	fuc			0		
									5	snd	fuc			0		
									5	gvl	fir			0		
									5	rck	fuc			0		
									6	rck	fuc			0		
									7	rck	fuc			0		
									8	gvl	fir			0		
									10	cbl				0		
									11	gvl				0		
									13	gvl	ulv			0		
									14	gvl	ulv			0		
									14	gvl	elg			4		
									15	gvl	elg			8		
									16	gvl	elg			15		
									18	mud	elg			1		
									20	mud	elg			0		
									22	snd				0		
									23	snd	lbk			0		
									24	snd	lbk			0		
									26	snd				0		
									27	snd	lbk			0		
									30	snd				0		
									32	snd				0		
									34	snd				0		
									35	snd				0		
									36	snd				0		
									37	snd				0		
									36	snd				0		
									36	snd				0		
									36	snd				0		
									36	snd				0		
									35	snd				0		
									34	snd				0		
									33	snd				0		
									32	snd				0		
									30	snd				0		
									28	snd				0		

								26	gvl	hir		0	
								25	gvl	hir		5	
								23	gvl	hir		10	
								22	gvl	fuc		25	loose
								19	gvl			15	
								18	gvl	fir		15	
								15	gvl	lbk		0	
								15	cbl	fil		0	+60m of bare gvl, no
								12	cbl	fil		0	sub for eggs to 6'
								12	cbl	fuc		0	+25m cbl/fuc no eggs
								13	gvl	red		0	
								14	gvl	red		0	
								15	gvl	lbk		0	
								16	cbl	lbk		0	
								19	cbl	lbk		0	
								20	cbl	lbk		0	
								21	gvl	lbk		0	
								22	gvl	lbk		0	
								24	gvl	lbk		0	
								25	gvl	lbk		0	
								29	gvl	lbk		0	
								35	gvl	lbk		0	
								38	gvl			0	
22-Apr-93	3	1407	1424	17	23	TM	PD	5	0	snd		0	
									2	snd		0	
									4	snd	fuc	0	
									2	snd	fuc	0	
									3	rck		0	
									3	snd		0	
									7	snd	fuc	0	
									10	snd	fuc	0	
									10	snd	fuc	0	
									10	snd		0	
									10	snd		0	
									11	rck	fuc	0	
									11	rck	fuc	0	
									13	rck	fuc	15	
									14	rck	fuc	0	
									14	rck	fuc	0	
									16	rck	elg	30	
									16	rck	elg	60	
									17	rck	elg	35	
									18	snd	elg	20	
									17	snd		0	
									18	snd	elg	10	
									18	snd	elg	90	
									19	snd	elg	30	
									20	snd	lbk	10	
									20	snd	elg	70	
									22	snd	elg	0	
									23	snd	elg	0	
									5	snd	elg	25	
									20	snd		34	sloping off all snd
22-Apr-93	4	1515	1621	106	34	RL	BL	5	5	rck	fuc		0
									7	rck	fuc		0
									9	cbl	fir		0
									10	cbl			0
									10	gvl	ulv		0
									11	snd	ulv		0
									11	snd	ulv		0
									11	snd	ulv		0
									12	snd	ulv		0
									12	snd	ulv		0
									12	snd	ulv		0
									12	snd	ulv		0

12	snd	ulv	0	
12	snd	ulv	0	
13	snd	ulv	0	
13	snd	elg	3	
13	snd	elg	20	
13	snd	elg	55	
13	snd	elg	65	
13	snd	elg	40	
13	snd	elg	40	
13	snd	elg	50	
12	snd	elg	25	
13	snd	elg	65	
14	snd	elg	10	
14	snd	elg	15	
14	snd	elg	15	
14	snd	elg	30	
14	snd	elg	35	
15	snd	elg	15	
15	snd	elg	5	
15	snd	elg	2	from rock in bight
16	snd	elg	40	
17	snd	elg	120	
17	snd	lbk	75	
19	snd	lbk	60	
20	snd	lbk	10	
20	snd		0	
20	snd		20	
20	snd	lbk	0	
20	snd		0	
20	snd		5	
21	snd		0	
21	snd	lbk	50	
22	snd	los	10	
22	snd		0	
22	snd	lbk	25	
23	snd	los	2	
23	snd	lbk	25	
23	snd	los	25	
23	snd	lbk	25	
24	snd	lbk	25	
24	snd		0	
24	snd	red	75	
24	snd		0	
24	snd		0	
24	snd		0	
25	snd	red	0	
25	snd	red	10	
25	snd		3	
25	snd		0	
26	snd	red	0	
26	snd	red	8	
26	snd	red	70	
26	snd	red	20	
26	snd	red	18	
26	snd	red	110	
26	snd	red	80	
27	snd	red	50	
27	snd	red	25	
28	snd	red	15	
28	snd	red	25	
28	snd	red	40	
28	snd	red	90	
28	snd	red	40	
28	snd	lbk	55	
29	snd		1	

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									29	snd			0	
									29	snd			0	
									30	snd			0	
									30	snd			0	
									31	snd			0	
									32	snd	lbk		0	
									33	snd	lbk		0	
									34	gvl			0	
22-Apr-93	5	1443	1509	66	49	TM	PD	5	0	rck	fuc	0		
									2	rck	fuc	0		
									3	rck	fuc	0		
									7	rck	fuc	1		
									10	rck	fuc	20		
									10	rck		30		
									12	rck		1		
									12	rck	hir	0		
									13	rck	hir	15		
									12	rck	hir	35		
									14	rck	hir	10		
									14	rck	fuc	45		
									14	rck	fuc	5		
									15	rck	hir	10		
									16	rck	hir	20		
									15	rck	hir	30		
									17	rck	hir	220		
									20	rck	lbk	90		
									22	rck	lbk	70		
									23	rck	lbk	15		
									25	rck	lbk	25		
									26	rck	lbk	25		
									28	rck	lbk	35		
									29	rck	lbk	35		
									32	rck	lbk	60		
									35	snd	lbk	15		
									37	cbl	lbk	1		
									40	cbl	lbk	15		Out of spawn. Some
									42	cbl	lbk	5		hatching in shallows.
									44	cbl	lbk	0		heavy bird predation.
									47	cbl	lbk	5		Went to 49' pretty
									49	snd	lbk	0		much out of spawn.
23-Apr-93	6	1105	1117	12	46	TK	PD	5	0	rck			0	
									-4	rck			0	
									-2	rck	fuc		1	
									1	rck	fuc		2	
									7	rck	lbk		25	
									10	rck	lbk		0	
									17	snd	lbk		3	
									21	rck	lbk		0	
									19	rck	lbk		0	
									13	rck	lbk		0	
									14	rck	lbk		0	
									17	rck	lbk		0	
									24	rck			0	
									36	shl			0	
									46	rck	fuc	0		
22-Apr-93	7	1554	1638	84	49	TM	PD	5	0	rck	fuc	0		
									7	rck	hir	10		
									10	rck	hir	20		
									12	rck	lbk	35		
									14	rck	lbk	60		
									16	rck	lbk	30		
									17	rck	lbk	3		
									16	rck	lbk	10		
									19	rck	lbk	0		
									20	rck	lbk	3		

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									21	rck	lbk	0	
									23	rck	lbk	0	
									25	rck	lbk	0	
									25	rck	lbk	0	
									27	cbl	lbk	1	
									28	cbl	lbk	0	
									30	cbl	lbk	5	
									30	cbl	lbk	3	
									30	cbl	lbk	2	
									31	cbl	lbk	15	
									32	cbl	lbk	8	
									33	cbl	lbk	30	
									34	cbl	lbk	30	
									35	cbl	lbk	0	
									35	cbl	lbk	18	
									36	cbl	lbk	1	
									36	cbl	lbk	1	
									37	cbl	lbk	1	
									38	cbl	lbk	3	
									40	cbl	lbk	60	
									40	cbl	lbk	10	
									41	cbl	lbk	0	
									41	cbl	lbk	0	
									42	cbl	lbk	1	
									42	cbl	lbk	5	
									43	cbl	lbk	10	
									44	cbl	lbk	0	
									45	cbl	lbk	2	
									46	cbl	lbk	3	
									47	cbl	lbk	0	
									48	cbl	lbk	1	
									47	cbl	lbk	0	
									49	cbl	lbk	1	
									49	cbl	lbk	1	
									49	cbl	lbk	0	
									49	rck	lbk	1	
									44	rck	lbk	1	
									40	rck	lbk	1	
									35	rck	lbk	0	
									33	rck	lbk	0	
									30	rck	lbk	1	
									30	rck	lbk	30	
									25	rck	lbk	20	
									24	rck	lbk	0	
									30	rck	lbk	0	
									40	rck	lbk	0	
									43	cbl		0	
23-Apr-93	8	1150	1225	75	47	TK	PD	5	-5	cbl	fuc		0
									-3	cbl	fuc		0
									-3	rck	fuc		15
									-4	rck	fuc		10
									-4	rck	fuc		0
									-2	rck	fuc		5
									-1	rck	fir		25
									7	rck	fir		20
									8	rck	lbk		110
									9	rck	lbk		60
									10	rck	lbk		80
									11	rck	lbk		50
									11	rck	lbk		50
									11	rck	lbk		10
									11	rck	lbk		30
									11	rck	lbk		50
									13	rck	lbk		60
									11	rck	lbk		90

									9	rck	lbk	80
									11	rck	fir	20
									9	rck	fir	120
									11	rck	lbk	100
									16	snd	lbk	2
									19	snd	lbk	5
									21	snd	hir	8
									22	snd	lbk	1
									23	gvl	lbk	5
									24	gvl	lbk	0
									26	gvl	lbk	0
									26	gvl	lbk	0
									27	gvl	lbk	0
									29	gvl	lbk	20
									29	snd	lbk	30
									32	snd	lbk	60
									33	snd	lbk	50
									34	gvl	lbk	60
									35	gvl	lbk	40
									36	gvl	lbk	10
									37	gvl	lbk	5
									39	gvl	lbk	20
									39	gvl	lbk	15
									41	gvl	lbk	40
									42	gvl	lbk	0
									43	gvl	lbk	1
									43	gvl	lbk	1
									45	gvl	lbk	0
									47	gvl	lbk	0
									47	gvl	lbk	0
									47	rck	fuc	0
23-Apr-93	9	1115	1148	33	38	TM	BL	5	0	rck	fuc	5
									-2	rck	fuc	0
									-3	rck	fuc	0
									-4	rck	fuc	0
									-5	rck	fuc	0
									-6	rck	fuc	0
									-7	rck	fuc	0
									-8	rck	fuc	0
									10	rck	lbk	20
									11	rck	lbk	60
									13	rck	lbk	50
									13	rck	lbk	45
									10	rck	lbk	35
									12	rck	lbk	10
									14	rck	lbk	25
									15	rck	lbk	35
									20	snd	lbk	15
									21	snd	lbk	0
									21	snd	lbk	40
									22	snd	lbk	1
									22	snd	lbk	1
									23	cbl	lbk	8
									23	cbl	lbk	8
									24	cbl	lbk	12
									24	cbl	lbk	10
									25	cbl	lbk	45
									25	cbl	lbk	2
									27	cbl	lbk	8
									27	cbl	lbk	12
									28	cbl	lbk	30
									29	cbl	lbk	45
									29	cbl	lbk	2
									30	cbl	lbk	20
									30	cbl	lbk	15

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									31	cbl	lbk	25		
									32	cbl	lbk	17		
									32	cbl	lbk	11		
									33	cbl	lbk	0		
									33	cbl	lbk	1		
									33	cbl	lbk	0		
									35	cbl	lbk	0		
									36	cbl	lbk	0		
									38	cbl	lbk	0		
									38	snd	elg	0		
24-Apr-93	10	1040	1057	17	16	TK	BL	5	7	gvl	elg		20	half way to transect
									8	gvl	lbk		10	#11, ends where 10
									8	gvl	lbk		0	and 11 meet.
									8	gvl	lbk		0	
									8	gvl	ulv		0	
									8	gvl	red		4	
									8	rck	fir		1	
									9	rck	lbk		5	
									9	gvl	red		1	
									10	gvl	hir		0	
									10	gvl	hir		0	
									10	cbl	red		0	
									11	cbl	lbk		1	
									11	cbl	red		0	
									11	cbl	lbk		0	
									11	cbl	lbk		20	
									12	cbl	lbk		2	loose
									12	cbl	lbk		2	
									13	snd	lbk		4	
									14	snd	lbk		0	
									14	snd	lbk		0	
									14	snd	lbk		1	
									15	snd	lbk		1	
									15	snd	lbk		0	
									15	snd	lbk		0	
									16	rck	fuc		5	
23-Apr-93	11	1212	1258	46	27	TM	BL	5	0	rck	fuc	0		from MHHW
									-4	rck	fuc	0		
									0	rck		0		
									2	rck	hir	0		
									7	rck	hir	2		
									7	rck	hir	2		
									8	rck	hir	20		
									9	rck	hir	17		
									9	rck	hir	12		
									9	rck	hir	30		
									9	rck	hir	12		
									10	rck	hir	18		bag# A1 TM eye 10
									10	rck	hir	8		+ 8 lost/BL eye 20
									11	rck	elg	5		
									11	rck	elg	7		
									11	rck	elg	15		
									12	rck	elg	10		
									12	rck	elg	45		
									13	rck	hir	20		
									13	rck	hir	70		
									14	rck	hir	3		
									13	rck	lbk	10		
									13	rck	lbk	3		
									13	rck	lbk	10		
									14	rck	lbk	18		
									14	rck	lbk	8		
									15	rck	lbk	3		
									16	rck	lbk	18		
									16	rck	lbk	25		

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									15	rck	lbk	3	
									16	rck	lbk	0	
									16	rck	lbk	0	
									17	rck	lbk	0	
									17	rck	lbk	1	
									18	rck	lbk	0	
									18	rck	lbk	1	
									18	rck	lbk	2	
									18	rck	lbk	1	
									19	rck	lbk	1	
									20	rck	lbk	13	
									20	rck	lbk	0	
									20	rck	lbk	1	
									21	rck	lbk	1	
									21	rck	lbk	20	bag 31, BL eye 25
									22	rck	lbk	0	
									22	rck	lbk	1	
									21	rck	lbk	0	
									23	rck	lbk	1	
									10	rck	lbk	8	BL eye 20
									23	rck	lbk	2	
									23	rck	lbk	0	
									24	rck	lbk	0	
									25	rck	lbk	0	
									25	rck	lbk	0	
									27	rck	fir	0	
23-Apr-93	12	932	951	19	24	TK	BL	5	-10	rck	hir	10	
									-10	rck	hir	5	
									-10	rck	hir	30	
									-10	rck	hir	15	
									-9	rck	hir	25	
									-9	rck	hir	35	
									-9	rck	hir	15	
									-10	rck	hir	10	
									-10	rck	hir	0	
									-8	rck	fuc	5	
									-3	rck	hir	0	
									-2	rck	hir	0	
									-1	rck	fuc	5	
									-1	snd	hir	0	
									-2	snd	cor	0	
									-3	snd		0	
									-4	snd		0	
									-5	snd		0	
									-4	snd		0	
									-4	snd		0	
									-4	snd		0	
									-4	snd		0	
									-3	snd		0	
									-3	snd		0	
									-3	snd		0	
									-3	snd		0	
									-3	snd		0	
									-3	snd		0	
									-3	cbl		0	
									-2	cbl	fuc	0	
									-1	rck	fuc	5	
									-3	rck	fuc	1	
									-2	rck	fuc	2	
									-2	snd	fuc	0	
									-2	snd		0	
									-2	snd		0	
									-2	snd		0	
									-3	snd		0	
									-3	cbl		0	

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									-2	cbl		0		
									-1	cbl		0		
									-1	cbl		0		
									0	cbl		0		from MHHW
									2	rck	lbk	160		
									4	rck	lbk	60		
									4	rck	fir	50		
									6	rck	lbk	10		
									7	rck	los	10		
									8	snd		70		
									9	snd		0		
									9	snd	lbk	0		
									11	snd	lbk	0		
									11	gvl	lbk	0		
									11	gvl	lbk	0		
									12	gvl	lbk	0		
									12	gvl	fir	0		
									12	gvl	lbk	0		
									12	gvl		0		
									12	snd		0		n shell male dung
									14	snd		0		n shell female dung
									15	snd		0		with eggs
									17	snd		0		
									19	snd		0		
									21	snd		0		
									24	rck		0		
24-Apr-93	13	947	1022	75	25	PD	RL	5	-14	rck	fuc		0	from MHHW
									-13	gvl	fuc		0	
									-13	gvl	fuc		0	
									-12	rck			0	
									-11	rck	los		1	
									-10	rck	fuc		1	
									-5	gvl			0	
									-3	gvl			0	
									-2	rck	fir		30	
									0	rck	fir		40	
									2	rck	fir		80	
									4	rck	lbk		20	
									6	rck	lbk		70	
									6	gvl	lbk		70	
									7	gvl	lbk		10	
									7	rck	lbk		50	
									6	rck	lbk		15	
									7	rck	lbk		8	
									7	rck	lbk		2	
									8	cbl	lbk		15	
									8	cbl	lbk		1	
									7	gvl	lbk		6	
									9	gvl	lbk		1	
									8	gvl	lbk		10	
									8	gvl	lbk		3	
									9	rck	lbk		0	
									9	rck	lbk		3	
									9	rck	lbk		2	
									9	rck	lbk		1	
									8	rck	lbk		8	
									12	rck	lbk		0	
									12	rck	lbk		2	
									15	rck	lbk		1	
									18	rck	lbk		0	
									21	rck	lbk		0	
									22	rck	lbk		0	
									23	gvl	lbk		0	
									24	gvl	lbk		0	
									25	gvl	lbk			

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23-Apr-93	14	1640	1717	77	28	TK	PD	5	3	rck	fuc	0		
									5	cbl	ulv	0		
									6	cbl	ulv	1		
									6	cbl	fuc	4		
									7	cbl	fuc	1		
									8	cbl	fuc	20		
									9	cbl	fuc	15		
									9	cbl	fil	15		
									9	cbl	fir	10		
									10	cbl	fir	20		
									9	cbl	fir	10		
									10	cbl	fir	5		
									10	cbl	fuc	40		
									11	cbl	fir	110		
									11	cbl	fir	100		
									11	cbl	fir	120		
									12	cbl	fir	160		
									11	cbl	fir	100		
									12	cbl	fir	80		
									12	cbl	lbk	70		
									13	cbl	lbk	100		
									13	cbl	lbk	180		
									13	cbl	lbk	140		
									13	cbl	lbk	160		
									14	cbl	red	140		
									15	cbl	fir	80		
									14	cbl	lbk	110		
									16	cbl	lbk	120		
									15	cbl	lbk	120		
									13	cbl	red	180		
									15	rck	lbk	200		
									16	cbl	hir	1		
									12	gvl	lbk	110		
									18	gvl	lbk	120		cucs present
									19	gvl	lbk	40		cucs present
									19	gvl	lbk	30		cucs present
									23	gvl	lbk	0		cucs present
									24	gvl	lbk	0		cucs present
									25	cbl	lbk	0		
									28	cbl	lbk	0		
24-Apr-93	15	1040	1102	62	20	RL	PD	5	-6	rck	fuc		0	
									0	snd	fuc		0	
									2	snd	ulv		0	
									3	snd	ulv		0	
									4	snd	lbk		0	
									4	cbl	fir		0	
									4	rck	lbk		0	
									3	rck	fuc		0	
									5	rck	lbk		0	
									5	cbl	lbk		0	
									9	snd	lbk		0	
									10	snd			0	
									10	snd			0	
									11	snd	hir		0	
									12	cbl	lbk		0	
									14	cbl	lbk		0	
									14	cbl	lbk		0	
									15	rck			0	good urchins
									13	rck			0	good urchins
									16	rck			0	
									20	rck	hir		0	
23-Apr-93	16	1125	1146	21	28	RL	PD	5	0	rck	fuc		0	from MHHW
									0	rck	fir		0	
									5	rck	lbk		2	
									7	gvl	los		1	

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									9	rck	lbk		1		
									8	rck	lbk		0		
									6	rck	hir		6		
									10	rck	hir		15		
									14	rck	hir		7		
									16	rck	agm		10		
									17	rck	agm		25		
									17	rck	agm		45		
									18	rck	agm		25		
									19	rck	agm		20		
									19	rck	agm		60		
									21	rck	agm		30		
									23	cbl	agm		28		
									25	cbl	agm		10		
									26	cbl	agm		0		
									27	cbl	agm		0		
									28	rck	agm		0		no cucs
23-Apr-93	17	1520	1532	12	40	TM	BL	5	0	rck	fuc	0			from MHHW
									9	rck	fuc	0			
									12	rck	hir	0			
									16	rck	hir	2			
									20	rck	hir	1			
									24	rck	lbk	0			
									30	rck	lbk	0			
									32	rck	lbk	2			
									31	rck	lbk	1			
									33	rck	lbk	40			
									33	rck	lbk	40			
									34	rck	lbk	65			
									35	rck	lbk	55			
									36	rck	lbk	45			
									36	rck	lbk	35			
									38	cbl	lbk	12			
									39	cbl	lbk	0			
									39	cbl	lbk	0			
									40	cbl	lbk	0			
									40	cbl	lbk	0			
									40	cbl	lbk	0			
									40	gvl	ulv	0			
24-Apr-93	18	1118	1136	18	28	TK	BL	5	3	snd	elg		0		
									3	snd	elg		0		
									3	snd	elg		0		
									3	gvl	ulv		0		
									4	gvl	ulv		0		
									4	snd	elg		0		
									4	snd	ulv		0		
									4	gvl	ulv		0		
									4	gvl	ulv		0		
									4	snd	elg		0		
									5	snd	elg		0		
									6	snd	elg		0		
									7	snd	elg		0		
									9	snd	elg		0		
									11	snd	elg		0		
									12	snd	elg		0		
									13	snd	elg		0		few big cucs
									14	snd	elg		0		
									16	snd			0		
									19	snd			0		
									24	snd			0		first geoduck
									26	snd			0		very sparse
									28	rck			0		
23-Apr-93	19	1553	1613	60	31	TM	BL	5	0	rck		0			from MHHW
									7	rck		0			
									10	snd	cor	0			

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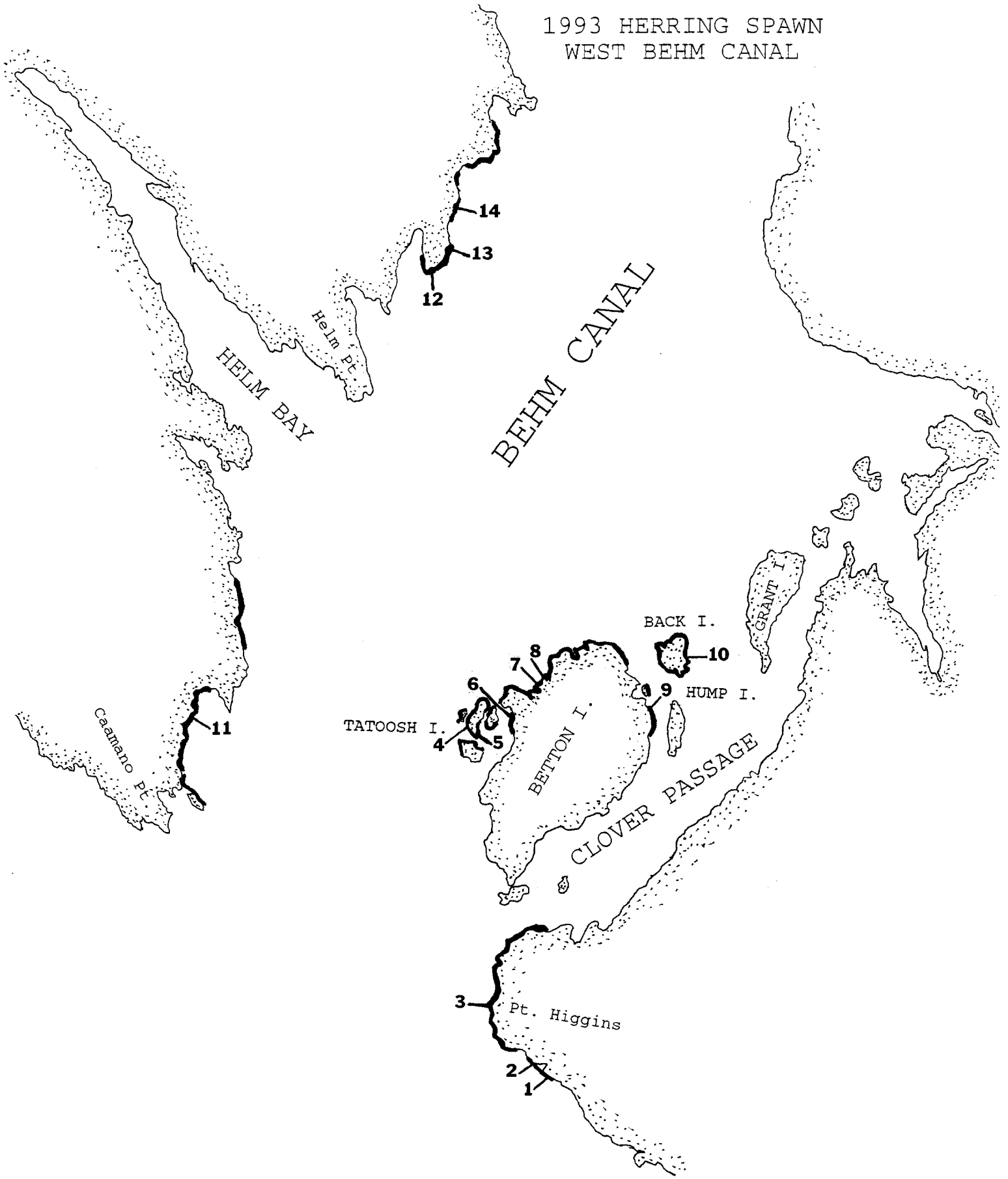
									12	snd	cor	0		
									14	snd	hir	0		
									15	rck	lbk	1		
									16	rck	lbk	0		
									17	rck	hir	1		
									17	rck	hir	3		
									17	rck	hir	0		
									18	rck	hir	1		
									19	rck	hir	0		
									21	rck	hir	20		
									21	rck	hir	40		
									21	rck	hir	35		
									21	snd	hir	0		
									23	snd	hir	0		
									25	snd	hir	0		
									30	snd	hir	0		
									31	rck	fuc	0		
23-Apr-93	20	1545	1555	10	32	TK	PD	5	5	rck	fuc		0	from rock
									7	rck	fuc		0	
									7	rck	fuc		0	
									9	rck	fir		0	
									12	rck	fil		0	
									14	rck	fil		0	
									15	rck	fir		0	
									16	gvl	lbk		0	
									19	gvl	lbk		0	
									27	gvl	lbk		0	
									32	gvl	lbk		0	no sign of eggs


1993 HERRING SPAWN
WEST BEHM CANAL
BEHM CANAL
HELM BAY
Helm Pt.
Caamano Pt.
GRANT I.
BACK I.
HUMP I.
BETTON I.
TATOOSH I.
CLOVER PASSAGE
Pt. Higgins
1
2
3
4
5
6
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8
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10
11
12
13
14

WEST BEHM CANAL HERRING SPAWN SURVEY 1993

DIVERS: Phil Doherty (PD), Tim Koeneman (TK), Robert Larson (RL), Brian Lynch (BL), Tim Minicucci (TM)

ABVS: Bottom Typ boulder=bld, cobble=cbl, fir=fir, gravel=gvl, mud=mud, mussels-mus, rock= rck, sand=snd, shell or shell hash=shl, woody debris=wdy

Veg. Type: alaria=ala, agarum=agm, coraline algae=cor, eelgrass=elg, fillamentous=fil, fucus=fuc, hairkelp=hir, laminaria=lam, large brown kelp=lbk, leafy red=red, loose=los, macrocystis=mac ulva=ulv

DATE	TRAN NO	TIME IN	TIME OUT	TOTAL TIME	MAX DEPT	DIVE NO.1	DIVE NO.2	INCREMENT (METERS)	DEPTH (FEET)	BOTTOM TYPE	VEG TYP	RL EYE	TM EYE	TK EYE	PD EYE	COMMENTS
26-Apr-93	1	1012	1029	17	29	TK	RL	5	1	bld	lbk			0		
									3	snd	elg			0.1		
									4	snd	elg			0		
									8	snd				0		
									12	snd				0		ducks
									15	snd				0		ducks
									22	snd				0		ducks
									29	snd				0		
26-Apr-93	2	1009	1015	6	36	TM	PD	5	-7	rck	fuc		0			from MHHW
									-5	rck	fuc		0			
									-4	rck	fuc		0			
									-3	rck	fuc		0			
									-1	rck	fuc		40			
									0	rck	hir		25			
									3	mud	mud		0			
									3	mud	mud		0			
									3	mud	mud		0			
									3	mud	mud		0			
									3	mud	mud		0			
									3	mud	mud		0			
									3	mud	mud		0			
									3	mud	mud		0			
									5	mud	mud		0			
									8	mud	mud		0			
									15	mud	mud		0			
									25	mud	mud		0			
									36	mud	mud		0			
26-Apr-93	3	937	946	9	34	TM	PD	5	-12	rck	fuc				0	
									-12	rck	fuc				0	
									-10	rck	fuc				0	
									-10	rck	fuc				0	
									-10	rck					0	
									-5	rck	fir				60	
									-3	rck	fir				180	bag #18 PD 165+15 los
									5	rck					0	
									15	snd	lbk				8	bag #8 PD 8/TM 12
									18	cbl					0	
									22	cbl					0	
									23	cbl					0	
									34	cbl					0	
25-Apr-93	4	1500	1525	25	22	TM	PD	5	8	rck			35			from 0'
									11	rck	hir		18			
									13	rck	fuc		50			
									13	cbl	fuc		30			
									13	cbl	ir		150			
									14	cbl	hir		120			
									15	rck	hir		140			
									15	rck	hir		140			
									15	rck	hir		130			
									16	rck	hir		140			

WEST BEHM CANAL HERRING SPAWN SURVEY 1993

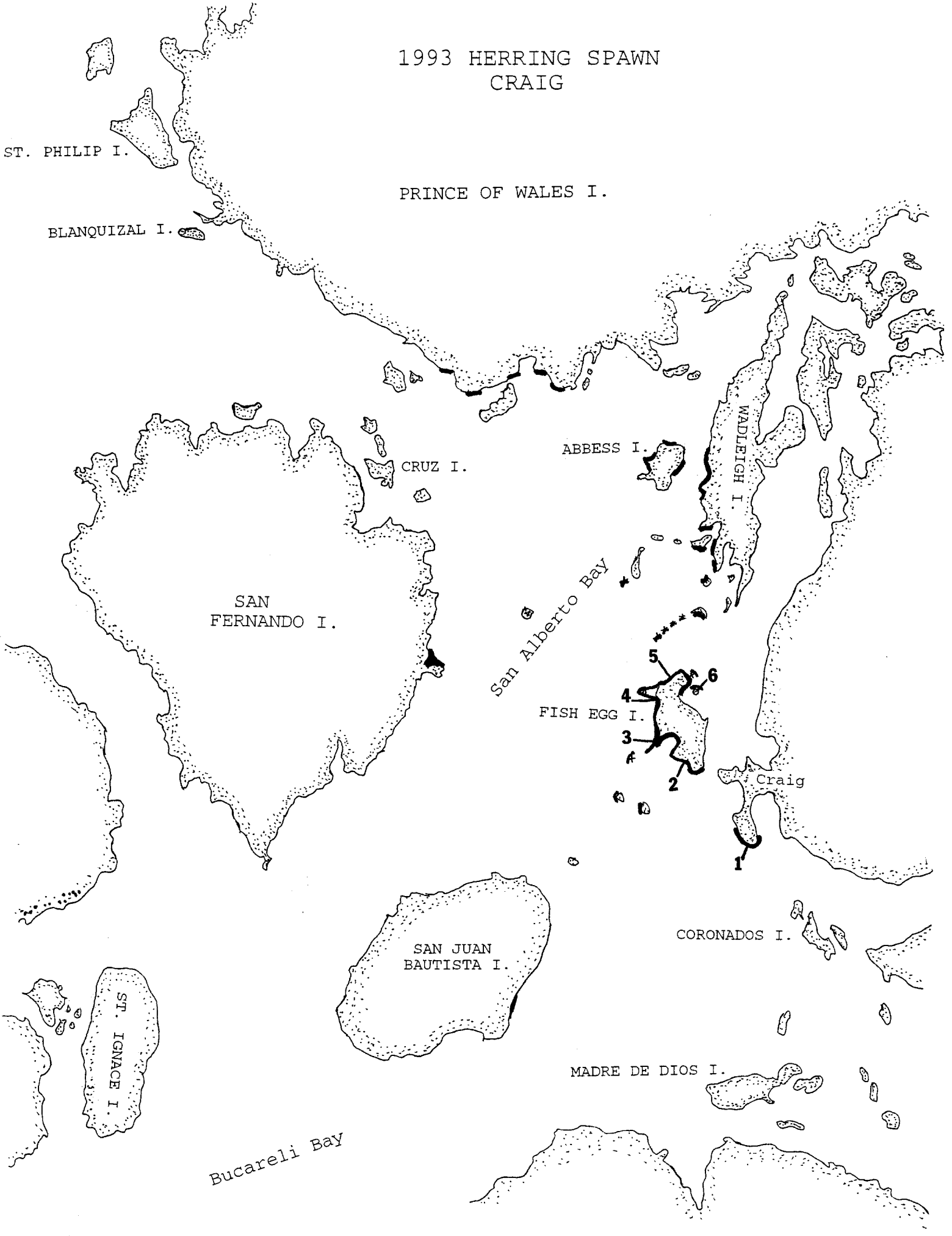
									17	snd	hir		200		bag #18 TM 190+10 lo
									17	snd	lbk		2		PD 155+10 lost
									17	rck	hir		1		
									18	rck	hir		15		bag #Z TM 15+5 lost/
									20	snd	hir		60		PD 20+5 lost
									20	snd	hir		50		
									20	rck	hir		250		
									22	cbl	hir		60		
25-Apr-93	5	1538	1544	6	35	PD	TM	5	1	rck	fuc			0	
									8	rck	fuc			35	
									9	rck	fuc			6	
									11	cob				0	
									13	snd	ulv			0	
									14	snd	elg			0	
									15	snd	elg			0	
									16	snd	elg			0	
									20	mud	elg			0	
									23	mud	elg			0	
									24	mud	elg			0	
									26	mud	elg			0	
25-Apr-93	6	1558	1614	16	35	PD	TM	5	2	rck	fuc			0	
									7	rck	fuc			0	
									14	rck	lbk			0	
									23	rck	lbk			0	
									35	rck	lbk			0	
26-Apr-93	7	918	925	7	30	RL	TK	5	-12	rck	fuc	0			
									-10	rck	fuc	0			
									-3	rck	fuc	1			
									2	rck	ulv	0			
									5	rck	lbk	2			
									10	rck	lbk	0			
									19	rck	lbk	0			
									24	rck	lbk	0			cucs start
									30	shl	lbk	0			bag #10 TK 1/RL 1
25-Apr-93	8	1548	1612	24	-35	TK	BL	5	-1	rck	fuc			0	bag #5 TK 60+80 lost/
									-11	rck	fuc			140	BL 45+75 lost
									-16	cob	fir			110	bag #15 TK 90+20 lost/
									-16	cob	fir			180	BL 90+30 lost
									-16	cob	lbk			50	
									-12	rck	red			1	
									-12	rck	fir			100	
									-16	bld	red			2	
									-20	bld	lbk			8	
									-15	rck	lbk			4	
									-17	rck	lbk			6	
									-24	rck	lbk			0	
									-25	rck	lbk			0	
									-26	rck	lbk			0	
									-35	rck	lbk			0	
25-Apr-93	9	1525	1530	5	28	TK	BL	5	12	rck	fuc			0	
									20	rck	fir			0	
									28	snd				0	
25-Apr-93	10	1504	1511	7	37	BL	TK	5	8	rck	fuc			0	
									15	rck	fir			0	
									17	snd	elg			0	
									19	snd	elg			0	
									22	snd				0	
									26	snd	lbk			0	

WEST BEHM CANAL HERRING SPAWN SURVEY 1993

									28	wdy			0
									34	wdy			0
									37	mud			0
25-Apr-93	11	1202	1208	6	14	TK	PD	5	1	rck	fuc		0
									3	rck	fir		5
									4	rck	elg		30
									6	rck	fir		30
									8	gvl	elg		0
									10	gvl	elg		0
									10	gvl	lbk		0
									11	gvl	lbk		0
									11	snd			0
									14	snd			0
									14	snd			0
									14	snd			0
									14	snd			0
25-Apr-93	12	1043	1057	14	36	TM	BL	5	-8	rck	fuc	5	
									-8	rck	fuc	30	
									-7	rck	elg	1	
									-7	rck	elg	15	
									-7	rck	elg	1	
									-6	rck	fuc	1	
									-6	rck	fuc	0	
									-5	rck		0	
									-4	rck	fuc	0	
									-3	rck	fuc	0	
									-3	rck	fuc	0	
									-3	rck	fuc	0	
									-3	rck	fuc	0	
									-3	rck	fuc	0	
									-3	rck	fuc	0	
									-3	rck	fuc	0	
									-3	rck	fuc	0	
									-3	rck	fuc	0	
									-1	rck	fuc	0	
									-1	rck	fuc	0	
									-1	rck	fuc	0	
									-1	rck	fuc	0	
									-1	rck	fuc	0	
									-1	rck	fuc	0	
									-1	rck	fuc	0	
									-1	rck	fuc	0	
									0	rck	fuc	0	
									1	rck	elg	100	
									2	rck	elg	110	
									3	rck	elg	70	
									5	snd		0	
									8	snd		0	
									9	snd	hir	2	
									12	snd	lbk	1	
									12	snd	lbk	0	
									13	snd	lbk	0	
									15	snd	lbk	0	
									17	rck	lbk	0	
									18	snd	elg	1	
									21	snd	elg	2	
									22	snd	elg	3	
									22	rck	lbk	0	
									24	snd		0	

WEST BEHM CANAL HERRING SPAWN SURVEY 1993

									26	snd		0		
									28	snd		0		
									30	snd		0		
									30	snd		0		
									32	snd		0		
									34	snd		0		
									36	snd		0		
25-Apr-93	13	1127	1140	13	33	TM	BL	5	-8	rck	fuc	0		40 m to MHHW
									-7	rck	fuc	5		
									1	rck	fuc	50		
									6	rck	hir	60		
									6	rck	elg	200		
									6	rck	elg	18		
									5	rck	elg	260		
									6	rck	elg	60		
									6	rck	hir	160		
									9	rck	lbk	35		
									13	rck	lbk	5		
									17	rck	lbk	7		
									23	rck	lbk	13		
									25	snd		0		dropping fast
									27	snd		0		
									29	snd		0		
									30	snd		0		
									31	snd		0		
									33	snd		0		
25-Apr-93	14	1056	1111	15	26	PD	TK	5	-4	rck	fuc		0	
									-1	rck	fuc		40	
									1	rck	ulv		30	bag #8 TK 12
									2	snd	fir		10	
									3	snd	fuc		180	TK eye 200
									7	rck	fir		150	bag #Z RL&TK 140+10
									9	snd	elg		2	
									11	snd	elg		4	
									14	snd	elg		0	
									20	snd			0	
									26	snd			0	


1993 HERRING SPAWN
CRAIG
ST. PHILIP I.
PRINCE OF WALES I.
BLANQUIZAL I.
ABBESS I.
WADLEIGH I.
CRUZ I.
SAN
FERNANDO I.
San Alberto Bay
5
6
4
FISH EGG I.
3
2
Craig
1
SAN JUAN
BAUTISTA I.
CORONADOS I.
ST. IGNACE I.
MADRE DE DIOS I.
Bucareli Bay

CRAIG HERRING SPAWN SURVEY 1993

DIVERS: Robert Larson (RL), Tim Minicucci (TM), Scott Walker (SW)

ABVS: Bottom Typ boulder=bld, cobble=cbl, fir=fir, gravel=gvl, mud=mud, mussels-mus, rock= rck, sand=snd, shell or shell hash=shl, woody debris=wdy

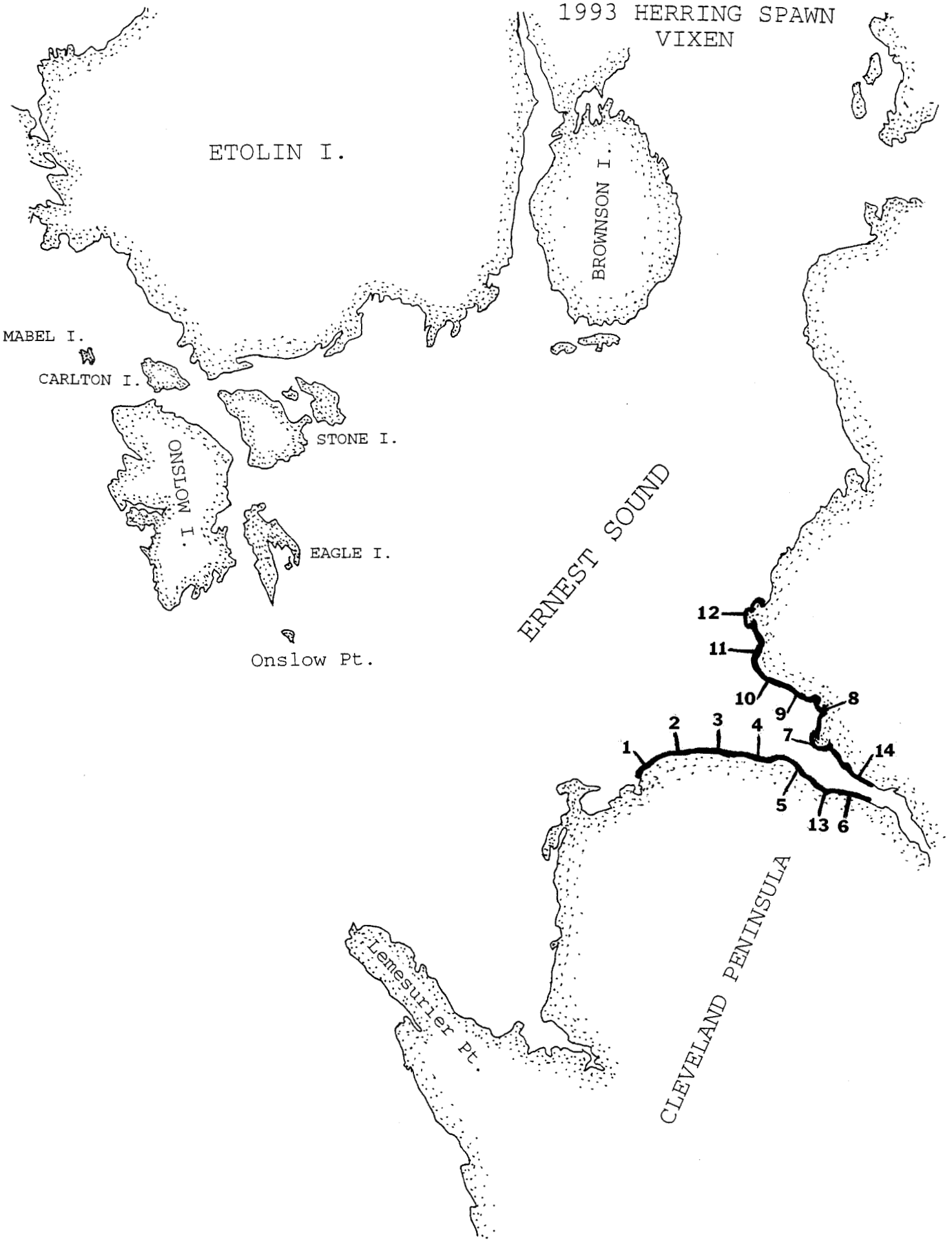
Veg. Type: alaria=ala, agarum=agm, coraline algae=cor, eelgrass=elg, fillamentous=fil, fucus=fuc, hairkelp=hir, laminaria=lam, large brown kelp=lbk, leafy red=red, loose=los, macrocystis=mac ulva=ulv

DATE	TRAN NO	TIME IN	TIME OUT	TOTAL TIME	MAX DEPT	DIVE NO.1	DIVE NO.2	INCREME (METERS)	DEPTH (FEET)	BOTTO TYPE	VEG TYPE	RL EYE	TM EYE	SW EYE	COMMENTS
08-Apr-93	1	843	853	10	30	RL	TM	5	-18	rck				0	
									-13	rck				0	
									-10	rck	fuc			0	
									-7	rck				0	
									-5	rck	hir			0	
									-3	rck	hir			0	
									-2	rck	elg			0	
									2	cor	mac	20			
									6	cor	mac	10			
									8	cor	mac	10			
									10	rck	agm	25			
									13	rck	mac	180			
									17	rck	mac	30			
									20	shl	lbk	20			
									23	shl	lbk	1			
									26	shl	lbk	3			
									30	shl		0			
08-Apr-93	2	929	949	20	35	TM	RL	5	-18	rck				0	
									-17	rck				0	
									-16	rck				0	
									-15	rck	fir			0	
									-12	rck	fir			0	
									-10	rck	fuc			50	
									-5	snd	elg			64	
									-4	snd	elg			46	
									-2	snd	elg			42	
									0	snd	elg			60	
									1	snd	elg		45		
									2	snd	red		20		
									3	snd	red		5		
									3	snd	red		0		
									4	snd	elg		0		
									6	snd	elg		0		
									8	snd	elg		0		
									8	snd	elg		0		
									10	snd	elg		0		
									10	snd	elg		0		
									11	snd	elg		0		
									12	snd	elg		0		
									13	snd	elg		1		
									13	snd	lbk		90		
									14	snd	lbk		40		
									15	snd	lbk		120		
									17	cbl	lbk		30		
									17	cbl	lbk		10		
									18	cbl	lbk		80		
									18	cbl	mac		650		
									19	cbl	lbk		8		
									21	cbl	lbk		1		

								21	cbl	lbk		140	
								21	cbl	lbk		40	
								22	cbl	lbk		30	
								24	cbl	lbk		10	
								25	cbl	lbk		10	
								25	cbl	lbk		20	
								26	cbl	lbk		8	
								27	cbl			0	
								29	cbl	lbk		5	
								29	cbl	lbk		5	
								30	cbl	lbk		20	
								30	cbl	lbk		1	
								31	cbl	lbk		1	
								32	cbl	lbk		0	
								33	cbl	lbk		1	
								33	cbl	lbk		5	
								34	cbl	lbk		0	
								35	cbl	lbk		0	
08-Apr-93	3	1022	1044	22	12	TM	RL	5	-15	rck			0
									-13	rck			0
									-14	rck			0
									-14	rck			0
									-14	rck	fuc		0
									-12	rck	fuc		0
									-6	cbl	fil		0
									0	cbl	fil		0
									1	cbl	elg	55	
									2	cbl	elg	120	
									3	cbl	lbk	55	
									4	cbl	lbk	35	
									5	snd	elg	110	
									5	snd	elg	50	
									5	snd	elg	55	
									5	snd	elg	45	
									5	snd	elg	15	
									6	cbl	mac	60	
									7	cbl	red	40	
									8	cbl	elg	35	
									9	cbl	mac	30	
									10	cbl	los	20	
									11	cbl	lbk	5	
									11	cbl	lbk	7	
									11	cbl	lbk	0	
									11	cbl	lbk	0	
									12	cbl	lbk	3	
									12	cbl	lbk	1	
									12	snd	elg	4	
									11	snd	elg	20	
									10	cbl	red	40	
									9	cbl	lbk	25	
									8	cbl	mac	360	
08-Apr-93	4	1022	1136	76	7	RL	TM	5	-13	snd			0
									-10	snd			0
									-6	gvl			0
									-5	gvl	elg		0
									-3	gvl	elg		0
									-1	gvl	elg		0
									0	fuc	elg		0
									1	mud	fuc	0	
									1	mud	fuc	0	
									2	mud	fuc	1	
									2	mud	mac	120	
									2	mud	fuc	50	
									2	mud	hir	30	
									3	mud	hir	5	

CRAIG HERRING SPAWN SURVEY 1993

									3	mud	hir	80	
									3	mud	elg	200	
									4	mud	hir	160	
									4	mud	hir	160	
									4	mud	hir	250	
									4	mud	hir	250	
									4	mud	hir	200	
									5	mud	hir	300	
									5	mud	hir	160	
									5	mud	hir	200	stopped/intersect other shore
08-Apr-93	5	1159	1213	14	30	TM	RL	5	2	gvl		0	from 0'
									3	gvl	fil	30	
									4	gvl	elg	80	
									6	gvl	elg	160	
									7	gvl	fil	0	
									7	snd		0	
									7	snd	elg	130	
									8	snd	elg	50	
									9	snd	elg	10	
									9	snd	elg	25	
									11	snd	elg	0	
									12	snd	elg	5	
									13	snd	elg	15	
									15	snd	elg	30	
									16	snd	elg	25	
									18	snd	elg	25	
									20	snd	agm	5	
									22	snd	agm	1	
									24	shl	lbk	0	
									26	shl	lbk	0	
									30	gvl	lbk	0	
08-Apr-93	6	1220	1243	23	29	TM	RL	5	0	rck	fuc		15
									3	rck	fuc		10
									4	elg			100
									6	elg			120
									6	snd	elg		160
									10	snd	elg		120
									11	snd	elg		10
									13	snd	elg		0
									14	snd	elg		0
									15	cbl	elg		0
									16	cbl	elg		1
									19	cbl	elg		0
									23	mud	elg		0
									24	mud	elg		0
									27	mud	elg		0
									29	mud	elg		0


1993 HERRING SPAWN
VIXEN
ETOLIN I.
BROWNSON I.
MABEL I.
CARLTON I.
ONSLOW I.
STONE I.
EAGLE I.
Onslow Pt.
ERNEST SOUND
12
11
10
9
8
7
14
2
3
4
1
5
13
6
Lemesurier Pt.
CLEVELAND PENINSULA

VIXEN INLET HERRING SPAWN SURVEY 1993

DIVERS: William Bergmann (WB), Tim Koeneman (TK), Robert Larson (RL), Tim Minicucci (TM)

ABVS: Bottom Type: boulder=bld, cobble=cbl, fir=fir, gravel=gvl, mud=mud, mussels-mus, rock= rck, sand=snd, shell or shell hash=shl, woody debris=wdy

Veg. Type: alaria=ala, agarum=agm, coraline algae=cor, eelgrass=elg, fillamentous=fil, fucus=fuc, hairkelp=hir, laminaria=lam, large brown kelp=lbk, leafy red=red, loose=los, macrocystis=mac ulva=ulv

DATE	TRAN NO	TIME IN	TIME OUT	TOTA TIME	MAX DEPT	DIVE NO.1	DIVE NO.2	INCREMENT (METERS)	DEPTH (FEET)	BOTTOM TYPE	VEG TYP	RL EYE	TM EYE	TK EYE	WB EYE	COMMENTS
30-Apr-93	1	817	825	8	23	TM	TK	5	9	rck	fuc		0			25 meters from MHHW
									10	rck	hir		0			
									12	rck	fuc		0			
									13	rck	fuc		0			
									14	snd	lbk		0			
									16	snd			0			
									17	cbl	elg		0			
									18	cbl	lbk		0			
									19	cbl	lbk		0			
									19	cbl	lbk		0			
									20	cbl	lbk		0			
									22	snd	hir		0			
									22	snd	lbk		0			
									22	snd	lbk		0			
									23	snd	lbk		0			
									23	snd	lbk		0			5 total cucs obs
30-Apr-93	2	832	844	12	25	TM	TK	5	4	rck	fuc		0			5 meters from MHHW
									5	rck	fuc		0			
									6	rck	fuc		0			
									6	rck	fuc		0			
									7	rck	fuc		0			
									9	rck	ulv		0			
									10	rck	ulv		0			
									11	rck	ulv		0			
									11	snd			0			
									13	snd			0			
									13	cbl	ulv		0			
									13	cbl	ulv		0			
									13	cbl	hir		0			
									14	cbl	ulv		0			
									15	cbl	elg		0			
									15	cbl	elg		0			
									15	cbl	ulv		0			
									15	cbl	ulv		0			
									15	cbl	ulv		0			
									15	cbl	lbk		0			
									15	cbl	lbk		0			
									15	cbl	lbk		0			
									16	rck	lbk		0			
									17	rck	lbk		0			
									18	rck	lbk		0			
									19	rck	lbk		0			
									20	rck	lbk		0			
									21	rck	lbk		0			
									22	rck	lbk		0			
									23	rck	lbk		0			
									24	rck	lbk		0			
									25	rck	lbk		0			
30-Apr-93	3	931	948	17	60	RL	WB	5	-6	rck	fuc	0				
									-3	rck	fuc	8				

VIXEN INLET HERRING SPAWN SURVEY 1993

									1	rck	fuc	45			
									4	rck	fir	30			
									12	rck	fir	90			
									15	snd		0			
									16	snd		0			
									18	snd		0			
									25	snd		0			
									32	snd		0			searched to 60 feet
29-Apr-93	4	1524	1539	15	58	TK	RL	5	-12	rck	fuc			10	from MHHW
									-7	rck	fuc			15	
									0	gvl				0	
									2	gvl				0	
									4	snd	elg			100	
									5	snd	fil			0	
									6	snd	fil			0	
									6	snd	fil			0	
									7	snd	ulv			0	
									8	snd	ulv			0	
									8	snd	elg			2	
									8	snd				0	
									8	snd				0	
									9	gvl	lbk			10	
									13	snd	elg			0	
									18	snd				0	searched to 58 feet
29-Apr-93	5	1437	1446	9	60	RL	TK	5	-8	rck			0		
									-6	shl			0		
									-4	rck	fuc		60		
									-3	rck	fuc		20		
									0	rck	fuc		15		
									4	gvl	ulv	0			
									8	gvl	lbk	0			
									13	gvl		0			
									18	gvl		0			searched to -60 feet
29-Apr-93	6	1601	1620	19	27	TK	RL	5	-12	rck	fuc			0	from MHHW
									-8	rck	fuc			15	
									-3	rck	fuc			1	
									2	gvl				0	
									3	gvl	fil			0	
									4	gvl	ulv			0	
									7	gvl	elg			0	
									8	gvl	elg			0	
									10	gvl	elg			0	
									12	snd	elg			0	
									15	snd	elg			0	
									17	rck	hir			0	
									19	snd				0	silt layer over sand
									21	snd				0	
									24	snd	lbk			0	
									27	snd				0	
29-Apr-93	7	1410	1418	8	16	TK	RL	5	1	gvl	ulv			0	20 meters to MHHW
									2	snd	elg			0	
									3	snd	elg			0	
									4	snd	elg			1	
									5	snd	elg			0	
									8	snd	elg			0	
									12	snd	elg			0	
									16	snd				0	
29-Apr-93	8	1340	1350	10	22	TK	RL	5	3	snd		0			50 meters intertidal

VIXEN INLET HERRING SPAWN SURVEY 1993

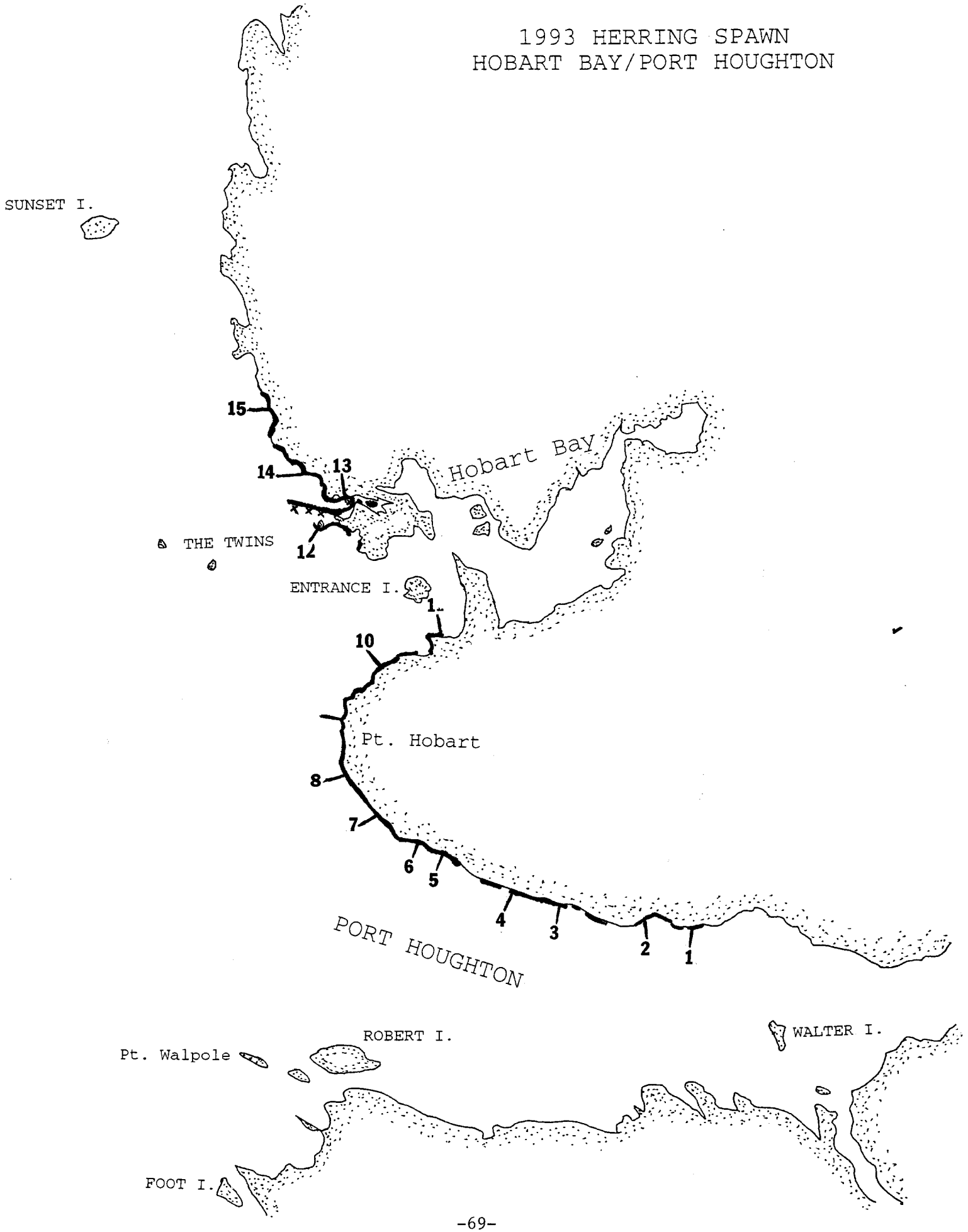
									3	snd		0		
									3	snd		0		
									4	snd	ulv	0		
									4	snd	ulv	0		
									5	snd	elg	0		
									5	snd	elg	0		
									5	snd	elg	0		
									5	snd	elg	0		
									5	snd	elg	0		
									5	snd	elg	0		
									7	snd	elg	0		
									7	snd	elg	0		
									11	snd	lbk	0		
									11	snd	lbk	0		
									15	snd		0		
									19	snd		0		
									22	snd		0		
30-Apr-93	9	857	915	18	35	TM	TK	5	-1	rck	fuc		0	
									0	rck	fuc		0	
									1	rck	fuc		1	
									2	rck	fuc		2	
									4	rck	fuc		15	
									7	gvl	ulv		1	
									7	snd	ulv		1	
									7	snd	ulv		0	
									8	snd	ulv		0	
									7	snd	ulv		0	
									6	snd	ulv		0	
									6	rck	fuc		0	
									6	rck	fuc		3	
									7	rck	fuc		1	
									7	rck	fir		0	
									8	rck	fir		2	
									9	rck	fuc		15	
									11	rck	ulv		0	
									11	rck	fil		0	
									13	snd	lbk		0	
									14	snd	lbk		0	
									15	snd	lbk		0	
									16	snd	lbk		0	
									16	snd	lbk		0	
									20	snd			0	
									25	snd			0	cucs present
									30	snd			0	
									32	snd			0	
									35	snd			0	
29-Apr-93	10	1741	1757	16	27	WB	TM	5	-3	rck	lbk	0		
									-2	rck	lbk	0		
									0	rck	lbk	0		
									2	rck	lbk	20		
									3	rck	lbk	35		
									8	rck	hir	30		
									10	rck	hir	7		
									11	rck	hir	0		
									12	rck	lbk	0		
									14	rck	lbk	0		
									15	snd	elg	0		+30 meters sand to 27'
29-Apr-93	11	1705	1725	20	34	WB	TM	5	-6	rck	fuc			10 from MHHW

VIXEN INLET HERRING SPAWN SURVEY 1993

									-3	rck	fuc		2	
									4	rck	fir		25	
									6	rck	fir		15	
									9	rck	fir		0	
									10	rck	fir		0	
									12	rck	ulv		0	
									14	rck	lbk		0	
									15	snd	hir		180	bag #22 TM 82+8 lost/
									17	snd	hir		30	WB 172+8 lost
									17	snd	hir		110	
									19	snd	hir		1	
									20	snd	hir		20	
									22	snd	hir		2	
									24	mud			0	
									28	mud			0	
									30	mud			0	
									34	mud			0	1 cuc this transect
29-Apr-93	12	1639	1649	10	36	WB	TM	5	-5	rck	fuc	50		from MHHW
									-4	rck	fuc	0		
									-3	rck	fuc	0		
									-2	rck	fuc	0		
									-1	rck	fuc	0		
									0	rck		0		
									3	rck	fuc	25		
									4	rck	hir	7		
									7	rck	hir	15		
									10	rck	lbk	0		
									12	rck	lbk	0		.05 cucs/m2
									14	rck	lbk	0		
									18	rck	lbk	0		
									19	rck	lbk	0		
									21	rck	lbk	0		
									27	rck	lbk	0		
									30	rck	lbk	0		
									36	rck	lbk	0		5 red urchins
30-Apr-93	13	825	839	14	29	RL	WB	5	3	gvl	fuc	0		40 meters to MHHW
									4	gvl	fuc	20		
									5	gvl		0		
									5	gvl		0		
									6	gvl	fil	0		
									6	gvl	fil	0		
									6	gvl	fil	0		
									6	gvl	fuc	0		
									6	gvl	ulv	0		
									6	gvl	ulv	0		
									7	gvl		0		
									7	gvl		0		
									6	gvl	fuc	0		
									6	gvl		0		
									7	gvl		0		
									7	gvl		0		dense blue mussels
									8	gvl		0		
									9	gvl	ulv	0		
									9	gvl	ulv	1		
									10	gvl	ulv	1		
									10	gvl	ulv	1		
									11	gvl	ulv	1		
									11	gvl	ulv	0		

VIXEN INLET HERRING SPAWN SURVEY 1993

									12	gvl	ulv	0		
									12	gvl	elg	0		
									13	gvl	elg	0		
									14	snd	elg	0		
									16	snd	elg	0		
									17	snd	elg	1		
									21	snd	lbk	0		first cuc
									24	snd	lbk	0		
									29	snd		0		
30-Apr-93	14	852	903	11	46	RL	WB	5	2	gvl	fuc		0	
									4	gvl	fuc		0	
									6	gvl	fuc		2	
									7	gvl	fuc		3	
									9	snd	ulv		0	
									11	snd	ulv		0	
									12	snd	ulv		0	
									13	snd	elg		6	
									15	snd	elg		0	
									20	mud			0	
									26	mud			0	searched to 46 feet


1993 HERRING SPAWN
HOBART BAY/PORT HOUGHTON
SUNSET I.
15
14
13
Hobart Bay
THE TWINS
12
ENTRANCE I.
1
10
Pt. Hobart
8
7
6
5
4
3
2
1
PORT HOUGHTON
ROBERT I.
Pt. Walpole
WALTER I.
FOOT I.

HOBART BAY/PORT HOUGHTON HERRING SPAWN DEPOSITION SURVEY 1993

DIVERS: Robert Larson (RL), Brian Lynch (BL), Will Bergmann (WB), Don Ingledue (DI), Randy Timothy (RT)

ABVS: Bottom Type: boulder=bld, cobble=cbl, fir=fir, gravel=gvl, mud=mud, mussels-mus, rock= rck, sand=snd, shell or shell hash=shl, woody debris=wdy

Veg. Type: alaria=ala, agarum=agm, coraline algae=cor, eelgrass=elg, fillamentous=fil, fucus=fuc, hairkelp=hir, laminaria=lam, large brown kelp=lbk, leafy red=red, loose=los, macrocystis=mac ulva=ulv

DATE	TRA NO	TIME IN	TIME OUT	TOTA TIME	MAX DEPT	DIVE NO.1	DIVE NO.2	INCREME (METERS)	DEPTH (FEET)	BOTTO TYPE	VEG TYP	RL EYE	WB EYE	COMMENTS
05-May-93	1	1008	1016	8	29	WB	BL	5	1	bld			0	from MHHW
									2	bld	fuc		0	
									7	bld	lbk		0	
									10	bld	lbk		0	
									19	cbl	agm		0	
									29	cbl	agm		0	no cucs or urchins
05-May-93	2	1014	1024	10	32	RL	DI	5	0	rck		0		
									10	rck	lbk	50		
									20	rck	lbk	80		
									32	cbl	lbk	0		1 cuc no urchins
05-May-93	3	1030	1024	12	28	WB	BL	5	-3	gvl			0	15 meters to MHHW
									-1	gvl			0	
									1	gvl			0	
									3	gvl	fuc		0	
									5	snd			0	
									7	snd			0	
									8	snd			0	
									9	snd	elg		0	
									9	snd	elg		0	
									7	snd	elg		0	
									7	snd	elg		0	
									8	snd	elg		0	
									9	snd	elg		2	
									10	snd	elg		10	
									11	snd	elg		10	
									11	snd	elg		1	
									19	snd			0	
									21	snd			0	
									28	snd			0	no cucs or urchins
05-May-93	4	1043	1052	11	28	RL	DI	5	1	rck	fuc	0		from 0 feet
									4	cbl		0		
									5	cbl		0		
									8	cbl	lbk	0		
									10	bld		0		
									13	snd		0		
									14	snd	elg	1		
									16	snd	elg	3		
									18	snd		0		
									21	snd		0		
									24	cbl	lbk	0		
									28	cbl		0		
05-May-93	5	1056	1107	11	24	WB	BL	5	2	cbl			0	20 meters to MHHW
									4	cbl	fuc		0	
									6	cbl	fuc		0	
									6	snd	fir		0	
									7	snd	fir		0	
									7	snd	fir		22	
									9	cbl	fuc		40	

									9	cbl	ala	3	
									10	cbl	ala	0	
									11	cbl	lbk	0	
									11	cbl	lbk	0	
									11	cbl	lbk	0	
									13	cbl	lbk	0	
									15	cbl	lbk	0	
									18	snd		0	
									24	snd		0	no cucs or urchins
05-May-93	6	1107	1122	15	23	RL	DI	5	3	bld	fuc	0	40 meters to MHHW
									4	rck	fuc	0	
									6	rck	fuc	6	
									2	rck		0	
									7	rck		2	
									10	rck	lbk	0	
									13	rck	lbk	0	
									14	snd	elg	3	
									15	snd	elg	4	
									16	snd	elg	8	
									18	snd	elg	3	
									23	snd		0	edge of steep bank
05-May-93	7	1119	1140	21	26	WB	BL	5	-3	bld	fuc	0	10 meters to MHHW
									0	cbl	fuc	30	loose
									2	rck	fuc	90	includes 70k loose
									2	rck	fuc	70	
									3	rck	fir	50	
									4	cbl	fuc	20	
									5	rck	fil	0	
									8	cbl		0	
									7	cbl	fuc	30	
									8	cbl	fuc	45	
									9	cbl	fuc	50	
									9	cbl	fuc	45	
									10	cbl	fir	0	
									11	cbl		0	a few green urchins
									12	cbl		0	
									13	cbl		0	
									14	snd		0	
									14	snd		0	
									14	snd		0	
									14	snd		0	
									14	snd		0	
									14	snd		0	
									14	snd		0	
									14	snd		0	
									15	snd		0	
									15	snd		0	
									16	snd		0	
									21	snd		0	
									24	snd		0	
									26	snd		0	no cucs
05-May-93	8	1140	1208	28	23	RL	DI	5	1	rck	fuc	0	from 0' depth
									4	rck	fuc	0	
									8	rck	fuc	60	
									10	rck	fuc	1	
									10	rck		20	

									12	rck		60	
									13	cbl		0	
									14	cbl	lbk	0	
									15	cbl	fil	0	
									16	cbl	lbk	4	
									16	rck	lbk	25	
									16	rck	lbk	20	
									15	rck	lbk	15	
									18	rck	lbk	5	
									18	rck	lbk	15	
									19	rck	lbk	0	
									20	rck	lbk	0	
									20	rck	lbk	0	
									21	cbl	lbk	0	
									21	cbl	lbk	0	
									22	cbl	lbk	0	
									22	cbl	lbk	0	
									22	cbl	lbk	0	
									23	cbl	lbk	0	
									23	cbl	lbk	0	
05-May-93	9	1723	1800	37	26	RL	DI	5	1	rck	fuc	15	30 Meters to MHHW
									2	rck	fuc	15	
									4	rck	hir	120	
									3	rck	lbk	180	
									5	rck	lbk	20	
									5	rck	lbk	40	
									5	rck	fil	120	
									5	rck	lbk	150	
									5	rck	lbk	45	
									6	rck	lbk	35	
									7	rck	lbk	50	
									8	rck	lbk	20	
									8	rck	lbk	20	
									9	rck	lbk	55	
									12	rck	lbk	2	
									14	rck	lbk	7	
									16	rck	lbk	12	
									18	rck	lbk	5	
									19	rck	lbk	20	
									19	rck	lbk	30	
									20	rck	lbk	2	
									26	snd		0	sand & lbk beyond
05-May-93	10	1554	1630	36	27	RL	RT	5	2	bld	fuc	0	35 meters to MHHW
									0	bld	fuc	0	
									1	bld	fuc	0	
									1	cbl	fuc	1	
									1	cbl	fuc	60	
									2	cbl	fuc	25	
									3	cbl	fuc	20	
									4	cbl	fuc	1	
									5	cbl		0	
									6	cbl		0	
									7	cbl	fil	0	
									8	cbl	fil	0	
									9	cbl	fil	0	
									9	snd		0	

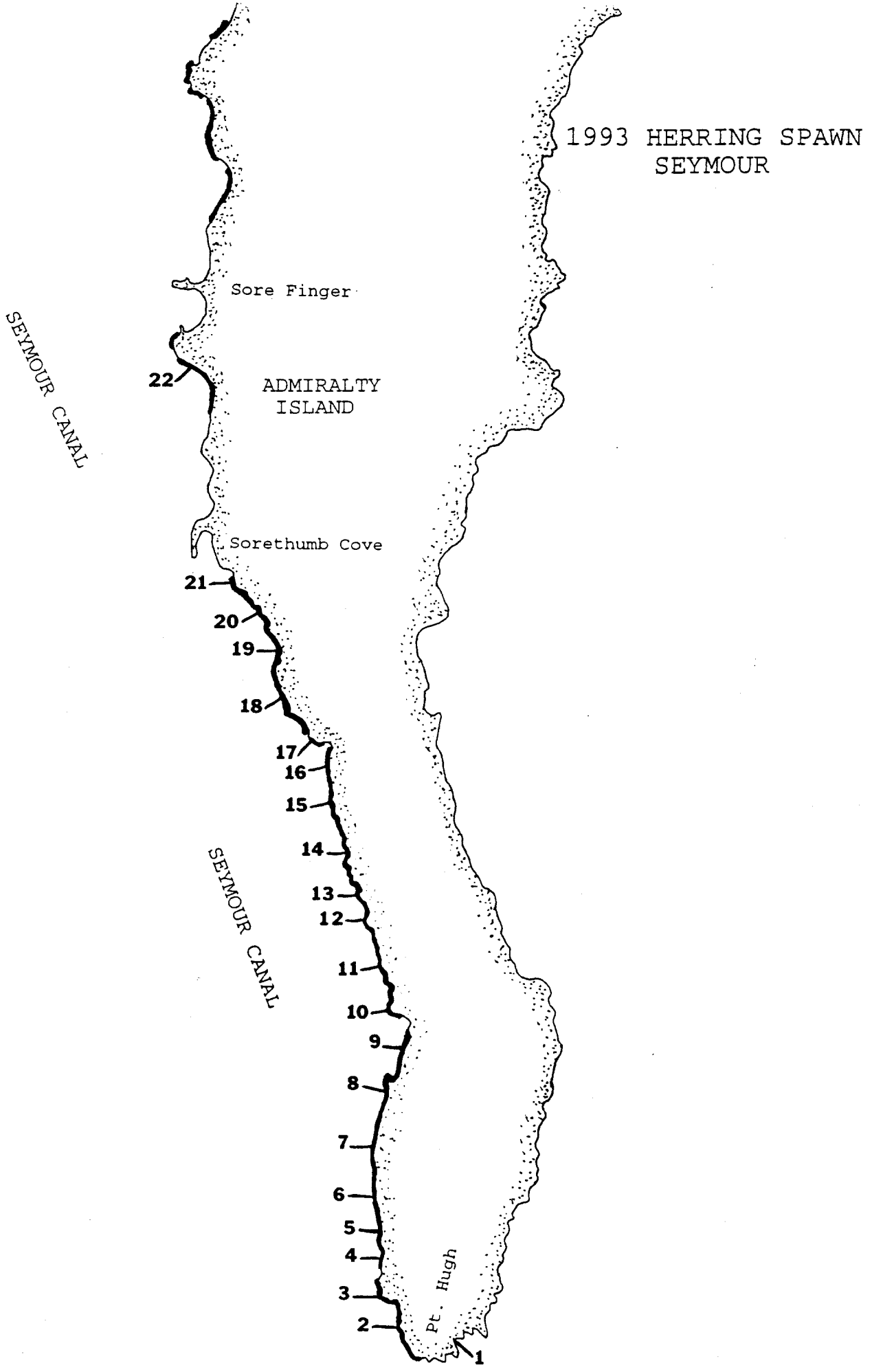
									9	snd		0		
									10	snd		0		
									10	snd		0		
									11	snd		0		
									11	snd		0		
									11	snd		0		
									8	rck	lbk	30		
									9	rck		0		
									9	rck	lbk	2		
									8	rck	lbk	1		
									9	rck	lbk	0		
									8	rck	red	35		
									9	rck	lbk	1		
									10	rck	fil	30		
									12	rck	fil	0		
									13	rck	lbk	0		
									14	rck	lbk	0		
									17	rck	lbk	0		
									21	rck	lbk	0		
									24	rck	lbk	0		
									27	rck	lbk	0		
05-May-93	11	1435	1529	54	24	RL	RT	5	2	cbl	fuc	0		from 0 feet
									3	cbl	fir	0		
									4	gvl		0		
									4	gvl	fir	0		
									4	gvl	fir	0		
									4	gvl	fir	0		
									4	gvl		0		
									4	gvl		0		
									3	gvl		0		
									2	rck	fuc	0		
									1	rck	fuc	0		
									2	rck	fuc	0		
									2	rck	fuc	0		
									4	rck	fuc	0		
									8	rck		0		
									10	rck	fil	0		
									11	rck		0		
									11	rck		0		
									12	rck	fuc	0		
									14	rck	lbk	0		
									15	rck	lbk	0		
									19	rck	lbk	20		
									19	rck	lbk	20		
									21	cbl	lbk	0		
									22	cbl	lbk	0		
									22	cbl	lbk	1		
									23	cbl	lbk	0		
									23	cbl	lbk	0		
									24	cbl	lbk	0		
									24	cbl	lbk	0		searched 30 M to 30'
05-May-93	12	1556	1608	12	32	WB	BL	5	5	bld	fuc		0.5	
									5	rck	fuc		25	
									6	bld	fuc		15	
									9	bld	fuc		20	
									10	cbl	fuc		0	

HOBART BAY/PORT HOUGHTON HERRING SPAWN DEPOSITION SURVEY 1993

									11	bld	fuc	0	
									12	rck	lbk	0	
									12	rck	lbk	0	
									16	rck	lbk	0	
									22	cbl	lbk	0	
									26	cbl	lbk	0	
									28	bld	lbk	0	
									32	snd	lbk	0	
05-May-93	13	1516	1540	24	15	WB	BL	5	3	snd		0	30 meters to MHHW
									4	snd		0	
									5	snd	fuc	0	
									6	snd		0	
									6	snd		0	
									6	snd		0	
									6	snd	fuc	0	
									6	snd	fuc	0	
									6	snd	fuc	0	
									6	snd		0	
									6	snd		0	
									6	gvl		0	
									7	gvl	fuc	0	
									8	mud	fuc	0	
									9	mud	fuc	0	
									10	mud	fuc	0	
									10	mud	ulv	0	
									10	mud	ulv	0	
									10	mud	fuc	0	
									10	mud	ulv	0	
									10	mud	ulv	1	
									10	mud	ulv	0	
									10	mud		0	
									10	mud		0	
									11	mud		0	
									12	mud	elg	1	
									13	mud		0	
									13	mud	elg	20	
									13	mud	elg	12	
									13	mud		0	
									13	mud		0	
									13	mud		0	
									14	mud	ulv	3	
									14	mud	fuc	3	
									14	mud	ulv	0	
									13	mud	lbk	2	
									12	mud		0	
									12	mud	fuc	0	
									12	mud	fuc	0	
									12	mud		0	
									12	mud		0	
									10	mud		0	
									10	mud		0	
									9	mud		0	
									10	mud		0	
									10	mud		0	
									10	mud		0	
									10	snd		0	
									10	snd	hir	1	
									12	snd	elg	2	
									12	shl	lbk	0	

									14	shl	lbk	3	
									15	gvl		0	
									14	gvl		0	
									14	gvl		0	
									15	gvl		0	
									14	gvl		0	1/2 way across
05-May-93	14	1440	1459	19	37	WB	BL	5	1	rck	fuc	0	from MHHW
									3	rck		0	mussels
									8	rck	fir	1	
									8	rck	fir	0	
									9	rck		1	
									10	rck		2	
									11	rck	lbk	0	
									12	rck	fuc	50	
									13	rck		0	
									14	rck		0	
									12	rck		0	
									12	rck	lbk	1.5	
									13	rck	fir	0	
									12	rck		0	
									13	rck	fuc	25	heavy scoter predation
									15	rck	lbk	25	
									15	rck	lbk	1	
									16	rck	lbk	1	
									16	rck	lbk	0	
									21	snd	lbk	0	
									22	snd	lbk	0	
									22	snd	lbk	0	
									23	snd	lbk	0	
									24	snd	lbk	0	
									23	rck	lbk	0	
									23	cbl	lbk	0	
									23	cbl	lbk	0	
									24	cbl	lbk	0	
									29	snd	lbk	0	
									30	snd	lbk	0	
									32	snd	lbk	0	
									35	snd	lbk	0	
									36	snd	lbk	0	
									37	snd	hir	0	no cuc, few gr urchins
05-May-93	15	1403	1424	21	35	WB	BL	5	8	cbl		0	from MHHW
									10	cbl	los	1	
									12	cbl	fuc	30	
									12	cbl	fuc	27	
									13	rck	ala	1	
									13	rck	ala	1	
									14	rck	ulv	1	
									14	cbl	ala	30	
									15	rck	lbk	15	
									17	rck	lbk	40	
									19	cbl	lbk	2	
									20	snd		0	
									20	snd		0	
									20	snd		0	
									20	snd		0	
									20	snd		0	
									22	snd		0	
									22	snd		0	
									22	snd		0	
									23	snd		0	
									24	snd		0	
									25	snd		0	

27	snd	0	
28	snd	0	
29	snd	0	
31	snd	0	
35	snd	0	no urchins or cucs


1993 HERRING SPAWN
SEYMOUR
Sore Finger
SEYMOUR CANAL
22
ADMIRALTY
ISLAND
Sorethumb Cove
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SEYMOUR CANAL
Pt. Hugh

SEYMOUR CANAL HERRING SPAWN DEPOSITION SURVEY 1993

DIVERS: Robert Larson (RL), Bill Davidson (BD), Will Bergmann (WB), Don Ingledue (DI), Tim Minicucci (TM)

ABVS: Bottom Typ boulder=bld, cobble=cbl, fir=fir, gravel=gvl, mud=mud
rock= rck, sand=snd, shell or shell hash=shl, woody debris=wdy
Veg. Type: alaria=ala, agarum=agm, barnacle=bar, coraline algae=cor, eelgrass=elg, fillamentous=fil, fucus=fuc, hairkelp=hir, laminaria=lam, large brown kelp=lbk, leafy red=red, loose=los, macrocystis=mac, mussels=mus, ulva=ulv

DATE	TRAN NO	TIME IN	TIME OUT	TOTAL TIME	MAX DEPT	DIVER NO.1	DIVER NO.2	INCREMENT (METERS)	DEPTH (FEET)	BOTTOM TYPE	VEG TYP	RL EYE	TM EYE	WB EYE	BD EYE	COMMENTS
11-May-93	1	1247	1310	23	11	TM	DI	5	-5	rck	fuc		3			30 meters to MHHW
									-4	rck	mus		0			
									-3	rck	snd		0			
									-2	rck	snd		4			
									0	rck	snd		5			
									1	rck	snd		50			
									2	rck	snd		15			
									2	rck	snd		10			
									2	rck	snd		10			abundant gr urchins
									2	rck	snd		3			
									3	rck	snd		1			
									3	rck	snd		50			
									4	rck	snd		20			
									5	rck	snd		0			cucs present
									7	rck	snd		0			
									8	rck	snd		0			
									10	rck	snd		0			
									10	rck	snd		0			
									10	rck	snd		0			
									10	rck	snd		0			
									10	rck	snd		0			
									10	rck	snd		0			
									11	rck	snd		0			
11-May-93	2	1320	1333	13	39	TM	DI	5	2	rck			0			10 meters to MHHW
									2	rck			0			
									4	rck	lbk		15			
									3	rck	lbk		1			
									7	rck	lbk		15			
									13	rck	lbk		45			
									20	rck	lbk		35			
									33	rck	lbk		0			
									39	rck	lbk		0			
11-May-93	3	1313	1319	6	34	RL	WB	5	-6	rck	mus			2		from MHHW
									-4	bld	fuc			20		
									-3	rck				0		
									2	rck	ala			85		
									18	rck	agm			130		
									34	rck	los			40		last herring dive 1993
11-May-93	4	1252	1302	10	31	RL	WB	5	-10	bld		0				10 meters from MHHW
									-8	bld	fuc	10				
									-4	bld	fuc	20				
									0	rck	ala	90				
									3	rck	ala	110				
									5	rck	lbk	120				
									8	rck	lbk	90				
									17	rck	agm	100				
									24	rck	agm	15				
									31	snd	lbk	0				
11-May-93	5	1210	1229	19	29	RL	BD	5	-12	rck		0				10 meters from MHHW
									-11	rck	fuc	0				

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									-8	rck	fuc	35		bag #3 RL 12/BD 10,
									-4	rck	bar	0		count for sample only
									0	bld	fil	10		bag #21 RL 22/BD 20,
									6	rck	hir	70		count for sample only
									8	rck	lbk	75		
									12	rck	agm	100		bag #10 RL 75+25 lost/
									21	rck	agm	6		BD 80+20 lost on rock
									29	cbl		0		
11-May-93	6	1131	1143	12	39	WB	BD	5	-10	rck			0	10 meters from MHHW
									-6	bld	fuc		70	
									-2	bld	fuc		340	
									0	bld	ala		110	
									2	bld	fir		100	
									4	bld	lbk		115	
									9	bld	agm		100	
									19	bld	agm		65	
									29	bld	agm		0	1 cuc
									39	bld	fil		0	1 cuc
11-May-93	7	1102	1110	8	35	WB	RL	5	-8	bld			5	from MHHW
									-4	bld	fuc		95	
									0	bld	fir		360	
									5	rck	hir		450	
									11	rck	lbk		140	
									16	rck	agm		100	
									27	bld	agm		3	
									35	bld	lbk		0	
11-May-93	8	1017	1043	26	26	RL	BD	5	-10	rck	fuc	0		10 meters to MHHW
									-8	rck	fuc	0		
									-6	rck	fuc	0		
									-5	rck		0		
									-4	rck	fuc	80		
									-2	rck	fuc	30		
									0	rck	fuc	25		
									1	rck	fir	110		bag #31 RL 90+20 lost/
									2	rck	red	30		BD 100+20 lost
									4	rck	ala	55		
									5	rck	ala	25		
									7	rck	agm	110		
									11	snd	los	1		
									12	snd	lbk	5		butter clams
									15	snd	lbk	0		
									18	snd	agm	0		mussels
									21	snd	agm	0		mussels
									26	snd	mus	0		first cuc
11-May-93	9	934	942	8	25	WB	BD	5	-10	rck			0	5m to MHHW
									-9	rck	fuc		0	
									-8	rck	fuc		0	
									-7	rck	fuc		0	
									-6	rck	fir		5	
									-5	rck	fir		2	
									-5	rck	fir		3	
									-5	rck	fir		0	
									-6	rck	mus		0	
									-4	rck	mus		0	
									1	bld			0	
									3	bld	fuc		2	
									7	gvl			0	
									8	snd	ulv		0	

									7	snd		0	
									6	snd		0	
									7	snd		0	
									7	snd		0	10-20 pink necks/m2
									9	snd		0	
									9	snd		0	
									15	snd		0	1/4" king crab
									19	snd		0	
									20	snd		0	2-1/4" king crabs
									24	snd		0	2 cucs
									25	snd		0	2 cucs
11-May-93	10	920	939	19	39	TM	DI	5	-3	rck	fuc	0	15m to MHHW
									-2	rck	fuc	0	
									-1	rck	fuc	5	
									0	rck	fuc	10	
									1	rck	fuc	30	
									1	rck	fuc	30	
									1	rck	fuc	20	
									2	rck	fuc	15	
									2	rck	fuc	10	
									3	rck	los	2	
									4	rck	ala	25	
									4	rck	hir	10	
									4	rck	lbk	3	
									4	rck	fuc	1	
									4	rck		20	
									7	rck		1	
									8	rck		1	
									9	rck	lbk	5	
									15	rck	lbk	30	
									21	rck	hir	8	
									24	snd	shl	1	
									27	snd		0	
									30	snd	shl	1	
									33	snd	shl	1	
									37	snd	shl	0	
									39	snd	shl	0	
11-May-93	11	946	1010	24	30	TM	DI	5	-3	rck		0	20m to MHHW
									-2	rck	fuc	30	
									-1	rck	fuc	0	
									0	rck	fuc	25	
									1	rck	ulv	2	
									2	rck	ala	1	
									4	snd	los	2	
									4	snd	los	2	
									5	snd	lbk	1	
									5	snd		0	
									5	snd		0	
									6	snd		0	
									6	snd		0	
									6	snd		0	
									6	snd		0	
									6	snd		0	
									6	snd		0	
									6	snd		0	
									6	snd		0	
									6	snd		0	
									6	snd		0	
									6	snd		0	

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									6	snd			0			
									3	rck	hir		1			
									10	snd			0			
									10	snd			0			
									11	snd	fuc		1			
									11	snd	fuc		1			
									12	rck	lbk		10			
									11	rck	lbk		25			
									16	rck	lbk		25			
									19	rck	lbk		15			
									22	rck	lbk		1			
									23	rck	lbk		0			
									25	rck	lbk		0			
									26	cbl	lbk		0			
									28	cbl	lbk		0			
									30	cbl	lbk		0			
10-May-93	12	1651	1714	23	29	WB	BD	5	2	cbl				0		10m to MHHW
									3	cbl				0		
									3	cbl				0		
									3	cbl	fuc			0		
									4	cbl	fuc			0		
									5	cbl				1		
									6	rck			22			
									7	rck			25			
									7	rck				6		
									8	rck			20			
									9	rck			15			
									9	rck				10		
									12	rck	lbk			7		
									15	snd				0		
									16	snd	lbk			1		
									16	rck	lbk		45			includes 20K loose
									18	rck	agm		30			
									19	snd	agm			30		
									23	snd				0		
									24	snd	lbk			10		
									26	snd				0		
									27	snd				0		octopus
									27	snd				0		
									29	snd				0		
10-May-93	13	1622	1636	14	33	WB	BD	5	3	rck			18			from MHHW
									4	rck			2			
									4	rck			20			
									6	rck	fuc		32			
									6	rck	fuc		4			
									7	rck	fuc		0			
									13	rck	ala		3			
									17	bld			0			
									19	cbl	lbk		1			
									21	snd			0			
									24	snd			0			
									26	snd			0			
									27	snd			0			
									29	snd			0			
									31	snd			0			
									33	snd	agm		0			
10-May-93	14	1630	1650	6	27	RL	DI	5	-3	rck		0				5 meters from MHHW
									3	bld	fuc	0				

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									4	bld	fil	0			
									7	bld	lbk	0			
									9	bld	fil	1			
									11	bld	fuc	0			
									10	rck		0			
									13	snd	hir	0			
									14	snd		1			pinknecks abundant
									15	snd		0			
									15	snd		0			
									16	snd		0			
									16	snd		0			
									18	snd		0			
									18	snd		0			
									18	snd		0			
									20	snd		0			
									21	snd		0			
									21	snd		0			
									22	snd		0			
									23	snd		0			
									25	snd		0			
									27	snd		0			
10-May-93	15	1605	1620	15	36	RL	DI	5	3	rck		0			20 meters from MHHW
									4	bld		0			
									8	bld		0			
									11	bld	ulv	0			
									15	rck	fil	1			
									17	bld	lbk	20			
									21	bld	agm	90			
									24	snd		0			
									25	snd		0			horse clams
									27	snd		0			
									28	snd		0			
									33	snd	lbk	0			
									36	snd	lbk	0			
10-May-93	16	1535	1602	33	35	WB	BD	5	3	rck	fuc			0	10 meters from MHHW
									4	rck	mus			0	
									4	rck	fuc			0	
									5	rck	ulv			0	
									6	rck				0	
									7	cbl	fuc			0	
									7	cbl	fuc		100		bag #37 70+30 lost
									7	cbl	fuc		170		bag #32 WB 130+40 lost
									10	cbl	fuc			0	/BD 150+30 lost
									11	cbl				0	
									14	cbl				2	few green urchins
									14	cbl	ulv			2	
									12	snd	ulv			35	
									12	rck	lbk		100		
									13	rck	lbk		70		
									13	rck	lbk		70		
									16	rck	lbk		45		
									17	snd	lbk		15		
									18	snd	lbk		25		
									20	snd	hir			0	tube worms
									21	snd				0	tube worms
									26	snd				0	tube worms
									35	snd				0	
10-May-93	17	1535	1545	10	39	RL	DI	5	-1	rck	fuc	0			5 meters to MHHW

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									11	rck	ala	0	
									23	rck	lbk	0	
									33	rck	agm	0	
									39	snd	mus	0	
10-May-93	18	1500	1521	21	35	RL	DI	5	-1	rck	bar	0	10 meters from MHHW
									2	rck	fir	0	
									3	rck	fuc	0	
									5	rck		0	
									6	rck		0	
									6	rck		0	
									6	rck		0	
									9	rck	ulv	8	
									11	rck	los	1	
									12	bld		0	
									12	cbl	lbk	0	
									14	cbl	lbk	0	
									14	cbl	lbk	0	
									16	cbl	lbk	70	
									17	snd		0	
									17	snd	lbk	2	
									17	snd	lbk	7	
									17	snd	lbk	5	
									17	bld	lbk	10	
									16	bld	lbk	0	
									18	bld	lbk	0	
									25	bld	lbk	0	
									30	bld	lbk	0	
									35	rck	lbk	0	
10-May-93	19	1145	1153	8	22	TM	DI	5	-3	rck	mus	0	20 meters to MHHW
									-2	rck	mus	0	
									-1	rck		0	
									0	rck	lbk	5	
									3	snd		0	
									3	snd		0	
									3	snd		0	
									4	snd		0	
									4	snd		0	
									4	snd		0	
									5	snd		0	
									6	snd		0	
									7	snd	hir	1	
									8	snd		0	
									8	snd	hir	0	
									9	snd	hir	0	
									10	snd	hir	0	
									12	snd	hir	0	
									13	snd	hir	0	
									15	snd	hir	0	
									15	snd	hir	0	
									16	snd	hir	0	
									17	snd	hir	0	
									19	snd	lbk	0	
									19	snd	lbk	0	
									20	snd	lbk	0	
									21	snd	lbk	0	
									22	snd	lbk	0	
									22	snd	lbk	0	
									22	snd	lbk	0	

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									22	snd	lbk	0	
11-May-93	20	1058	1118	20	25	TM	DI	5	-3	rck	fuc	2	
									-3	rck	fuc	1	
									-3	rck	fuc	4	
									-3	rck	fuc	5	
									-3	rck	ulv	1	
									-2	rck	fuc	15	
									-2	rck	fuc	40	
									-2	rck	fuc	2	
									-2	rck	fuc	4	
									-2	rck	mus	0	
									-1	rck	mus	0	
									-1	rck	mus	0	
									-1	rck	fuc	0	
									-1	rck	fuc	0	
									-1	rck	fuc	0	
									-1	rck	ulv	0	
									-1	rck	mus	0	
									-1	rck	mus	0	
									-1	rck	fuc	25	
									-1	gvl	ulv	0	
									0	snd	lbk	0	
									2	rck	lbk	1	
									4	rck	lbk	1	
									6	rck	lbk	4	
									9	rck	hir	0	
									11	rck	lbk	1	
									11	rck	hir	0	
									11	snd	lbk	25	
									11	snd	lbk	0	
									10	cbl	lbk	5	
									12	cbl	lbk	25	
									12	cbl	lbk	1	
									12	cbl	lbk	1	
									12	cbl	lbk	0	
									13	cbl	lbk	15	
									14	snd	lbk	0	
									14	snd	lbk	0	
									14	snd	lbk	0	
									14	snd	lbk	0	
									15	snd	lbk	0	
									18	snd	lbk	0	
									20	snd	lbk	0	
									21	snd	lbk	0	
									22	snd	lbk	0	
									23	snd	lbk	0	
									25	snd	lbk	0	
10-May-93	21	1420	1443	23	23	RL	DI	5	-3	bld	fuc	0	30m from MHHW
									-1	rck	mus	0	
									1	rck	mus	0	
									3	rck	fuc	1	
									4	rck		0	
									5	rck		0	
									6	rck		0	lots sm urchins
									9	rck	ala	2	
									12	snd	hir	1	
									15	snd	hir	1	
									16	snd	hir	0	

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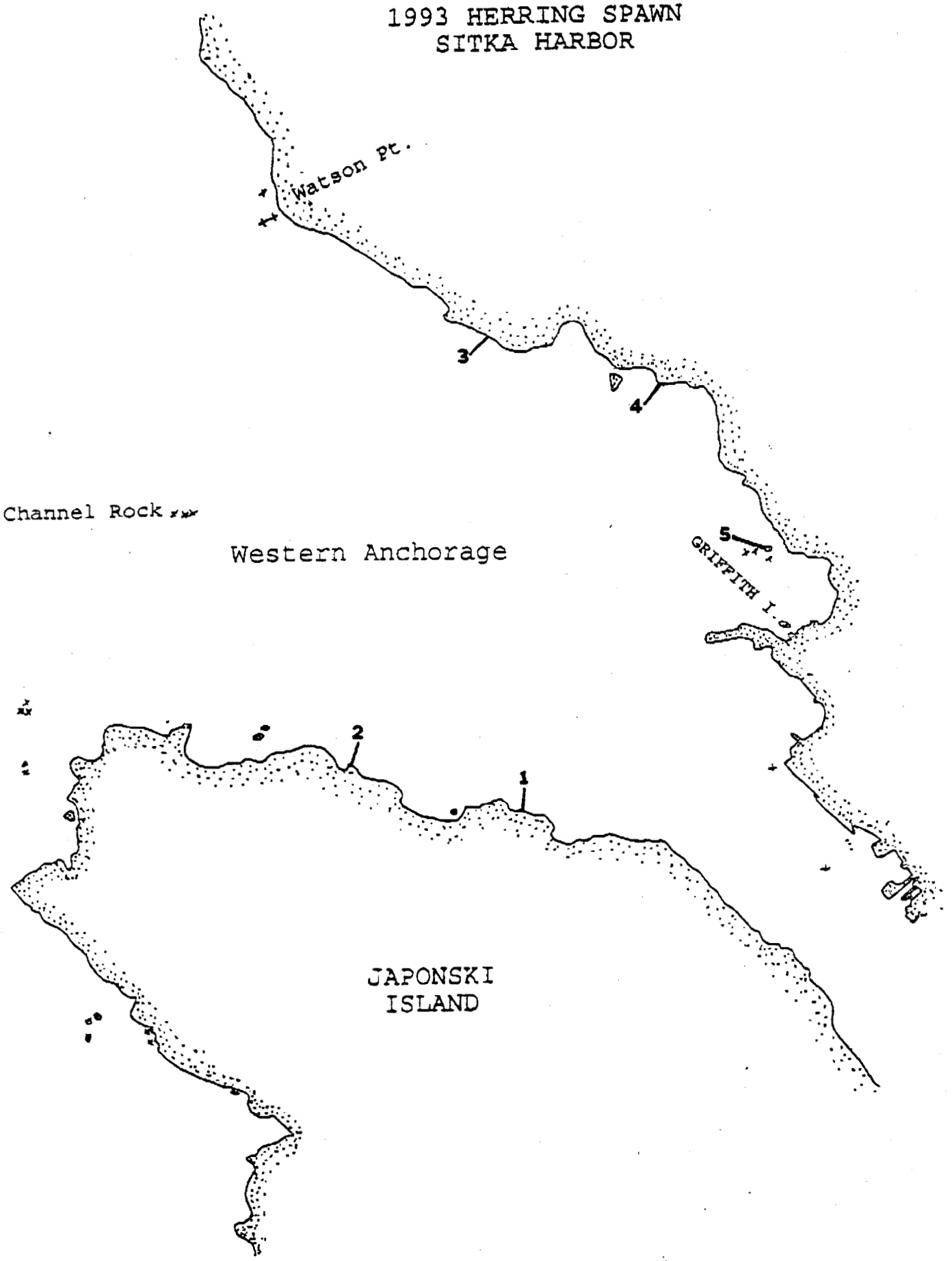
									17	snd	hir	0		
									17	snd	lbk	0		
									18	snd	hir	0		
									19	snd	hir	0		
									20	snd	hir	0		
									20	snd	lbk	0		
									23	snd		0		
10-May-93	22	1445	1505	20	30	WB	BD	5	-4	rck	fuc		0	+10m to MHHW
									-3	rck	fuc		0	
									-2	cbl	fuc		0	
									0	rck	fuc		0	
									1	rck	fuc		1	
									1	rck	fuc		7	
									2	rck	fir		120	
									2	bld	fuc		2	
									2	rck	fuc		0	
									3	rck	los		1	
									4	rck	fir		0	
									4	rck	ulv		0	
									5	rck	ulv		0	
									5	rck	fir		0	
									5	rck	ulv		0	2 sm green urchins
									5	rck	ulv		0	
									5	rck	ulv		0	
									6	rck	ulv		0	
									6	rck	ulv		0	
									7	rck	ulv		0	
									7	rck	ulv		0	50 1/2-1 1/2" gr.urchins/m2
									8	rck			0	100 1/2-1 1/2" gr.urchins/m2
									9	bld			0	100 1/2-1 1/2" gr.urchins/m2
									9	bld			0	100 1/2-1 1/2" gr.urchins/m2
									10	bld			0	100 1/2-1 1/2" gr.urchins/m2
									8	rck			0	150 1/2-1 1/2" gr.urchins/m2
									9	rck			0	100 1/2-1 1/2" gr.urchins/m2
									10	rck	ulv		0	100 1/2-1 1/2" gr.urchins/m2
									10	rck	ulv		1	no green urchins
									14	rck	hir		2	
									16	rck	hir		10	
									17	rck	hir		12	
									20	bld	hir		0	
									20	bld			0	
									22	cbl			0	
									25	cbl			0	18" old shell
									25	cbl			0	male king crab
									27	cbl			0	
									30	cbl			0	4 cucs


1993 HERRING SPAWN
SITKA HARBOR
Watson Pt.
3
4
Channel Rock
Western Anchorage
5
GRIFFITH I.
2
1
JAPONSKI
ISLAND

SITKA BOAT HARBOR HERRING SPAWN SURVEY 1993

DIVERS: Robert Larson (RL), Tim Minnicucci (TM), Bill Hughes (BH), Ed Grossman (EG)

ABVS: Bottom Typ boulder=bld, cobble=cbl, fir=fir, gravel=gvl, mud=mud, mussels-mus, rock= rck, sand=snd, shell or shell hash=shl, woody debris=wdy

Veg. Type: alaria=ala, agarum=agm, coraline algae=cor, eelgrass=elg, fillamentous=fil, fucus=fuc, hairkelp=hir, laminaria=lam, large brown kelp=lbk, leafy red=red, loose=los, macrocystis=mac ulva=ulv

DATE	TRAN NO	TIME IN	TIME OUT	TOTAL TIME	MAX DEPT	DIVER NO.1	DIVER NO.2	INCREMENT (METERS)	DEPTH (FEET)	BOTTOM TYPE	VEG TYPE	RL EYE	TM EYE	COMMENTS
10-Apr-93	1	1753	1817	24	38	RL	BH	5	0	rck	fuc	0		transect starts 15 meters
									7	cbl	red	1		from rock bank
									10	cbl	lbk	1		
									10	gvl	elg	20		target for compass is
									12	gvl	lbk	50		origin of transect #14
									14	gvl	lbk	20		
									17	gvl	lbk	15		
									19	gvl	lbk	40		
									21	gvl	lbk	25		
									23	gvl	lbk	20		
									26	gvl	lbk	65		
									28	gvl	lbk	25		
									32	gvl	lbk	15		
									33	gvl	lbk	10		
									35	snd		0		
									36	snd	red	20		
									37	mud		0		
									38	mud	agm	25		
									38	shl	agm	15		
									38	shl		0		
									38	mud		0		
									38	mud		0		
12-Apr-93	2	1000	1040	40	35	TM	EG	5	-6	rck	fuc		0	from MHHW, compass bearing 350
									-5	rck	fuc		0	mag. (to origin of transect #3)
									-4	rck			0	
									-3	rck	fuc		40	
									-2	rck			30	
									0	rck	fil		80	
									1	rck	fil		30	
									1	rck	lbk		60	
									1	rck	lbk		80	
									1	cbl	lbk		50	
									1	rck	lbk		120	
									1	rck	lbk		100	
									2	cbl	lbk		0	
									2	cbl			0	
									2	rck	cor		1	
									3	rck			1	
									3	rck			30	
									4	rck			0	
									4	cbl	lbk		40	
									4	cbl	lbk		60	
									7	cbl	lbk		40	
									7	cbl	lbk		50	
									8	cbl	lbk		50	
									8	cbl	lbk		90	
									8	cbl	lbk		60	
									9	cbl	lbk		70	
									10	cbl	lbk		40	
									11	cbl	lbk		70	
									11	cbl	lbk		90	
									11	cbl	lbk		100	
									12	cbl	lbk		50	
									12	cbl	lbk		60	
									13	cbl	lbk		4	
									13	cbl	lbk		50	
									14	cbl	lbk		20	

SITKA BOAT HARBOR HERRING SPAWN SURVEY 1993

									14	cbl	lbk	10	
									15	snd	lbk	5	
									16	snd	lbk	10	
									16	snd	lbk	30	
									17	snd	lbk	30	
									18	snd	lbk	20	
									18	snd	lbk	5	
									20	snd	lbk	1	
									21	snd	lbk	5	
									22	snd	lbk	5	
									24	snd	lbk	5	
									26	snd	lbk	5	
									29	snd		0	
									31	snd	lbk	3	
									34	snd		0	increased slope of sand and
									35	snd		0	mud, no additional spawn
10-Apr-93	3	1534	161	40	30	TM	EG	5	2	rck		0	from MHHW
									2	rck		2	compass bearing approx. 230
									3	rck	red	40	degrees to Channel Rock
									3	rck		25	
									4	rck	red	50	
									4	rck		20	
									5	rck	red	60	
									5	rck	hir	20	
									7	rck	hir	10	
									7	rck	hir	80	
									7	rck		160	
									8	rck	lbk	160	
									9	rck	lbk	90	
									10	rck		10	
									11	rck	lbk	30	
									13	cbl	lbk	50	
									14	rck	hir	0	
									16	rck	lbk	10	
									16	cbl	lbk	20	
									17	cbl	lbk	5	
									18	cbl	lbk	20	
									18	cbl	lbk	80	
									19	cbl	lbk	200	
									19	cbl	lbk	120	
									19	cbl	lbk	30	
									21	cbl	lbk	5	
									22	cbl	lbk	40	
									22	cbl	lbk	140	
									23	cbl	lbk	70	
									24	cbl	lbk	40	
									24	cbl	lbk	30	
									24	cbl	lbk	70	
									24	cbl	lbk	40	
									24	cbl	lbk	30	
									25	cbl	lbk	30	
									25	cbl		5	loose eggs
									25	cbl		1	loose eggs
									25	cbl		1	loose eggs
									26	snd		0	loose eggs
									26	snd	lbk	2	loose eggs
									26	snd		0	loose eggs
									26	snd	los	1	loose eggs
									26	snd	los	2	loose eggs
									26	snd	los	2	loose eggs
									27	snd	los	1	loose eggs
									28	snd	los	1	loose eggs
									29	snd	los	1	loose eggs
									29	snd	los	1	loose eggs
									30	snd		0	loose eggs

SITKA BOAT HARBOR HERRING SPAWN SURVEY 1993

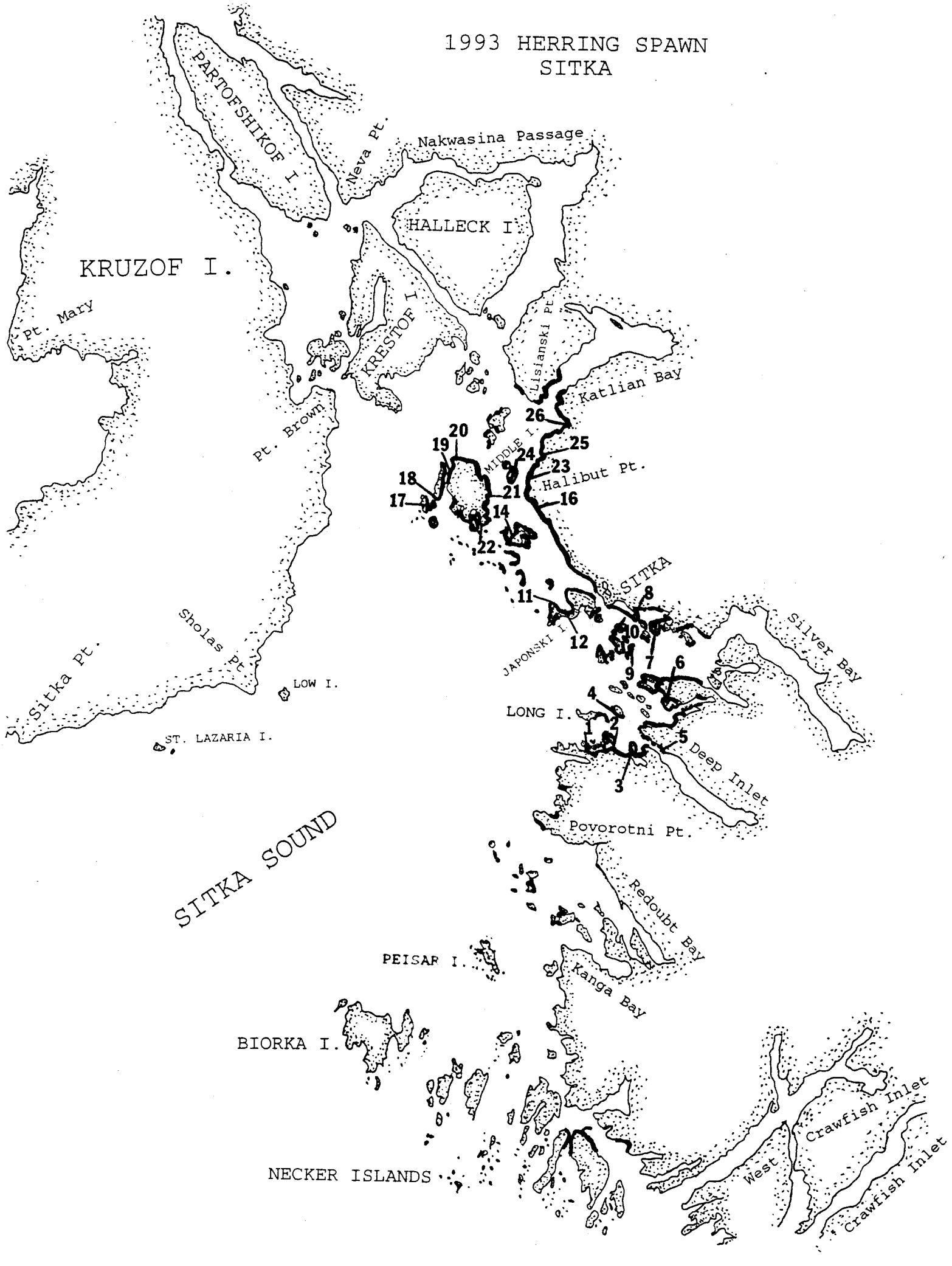
10-Apr-93	4	1228	1310	42	38	TM	EG	5	30	snd		0	loose eggs
									-6	rck		0	start MHHW south side of
									-3	rck		0	rock, brown house/yellow trim
									-2	mud	elg	0	transect bearing to Coast
									-1	mud	elg	15	Guard main building approx.
									-1	mud	elg	8	210 degrees magnetic
									0	mud	elg	0	
									0	snd	elg	0	
									0	snd	elg	0	
									1	snd	elg	0	
									1	snd	elg	1	
									1	rck		0	
									1	rck	cor	3	
									1	snd	elg	60	
									1	cbl	lbk	70	
									2	cbl	lbk	30	
									2	cbl	lbk	60	
									3	cbl	elg	30	
									3	snd	elg	200	
									4	snd	elg	240	
									4	snd	elg	200	
									4	snd	elg	240	
									4	snd	elg	180	
									5	snd	elg	260	
									5	snd	elg	320	
									5	snd	elg	90	
									5	snd	elg	20	
									6	snd	elg	15	
									6	snd	elg	10	
									7	snd	elg	5	
									7	snd	elg	20	
									7	snd	elg	1	
									7	snd	lbk	40	
									8	snd	lbk	120	
									8	rck	lbk	140	
									8	rck	lbk	70	
									9	rck	cor	240	
									9	rck	lbk	40	
									10	cbl	lbk	30	
									10	cbl	lbk	10	
									11	cbl	lbk	40	
									12	cbl	lbk	120	
									15	cbl	lbk	20	
									13	cbl	lbk	160	
									14	cbl	lbk	60	
									16	cbl	lbk	120	
									16	cbl	lbk	200	
									18	cbl	lbk	100	
									19	cbl	lbk	120	
									20	cbl	lbk		
									22	cbl	lbk	80	
									23	cbl	lbk	10	
									24	snd	los	40	
									25	snd		0	
									27	snd		0	
									29	snd		0	
									30	snd		0	
									32	snd		0	
									33	gvl	lbk	2	
									34	gvl	lbk	10	
									34	gvl	lbk	15	
									35	gvl	lbk	20	
									35	gvl	lbk	60	
									35	gvl	lbk	60	
									35	gvl	lbk	20	

SITKA BOAT HARBOR HERRING SPAWN SURVEY 1993

									36	gvl	lbk		40	
									36	gvl	lbk		30	
									37	gvl	lbk		20	
									38	gvl	lbk		15	
10-Apr-93	5	1005	1047	42	35	TM	EG	5	-7	rck	fuc	0		starting point is top of
									-6	rck	fuc	0		rock, north side transect
									-5	cbl		0		bearing to white residence
									-4	cbl		1		building approx. compass
									-4	cbl		0		heading 230 degrees magnetic
									-4	gvl		8		1k loose eggs, cbl with barnacles
									-3	rck		0		butterclams and barnacles
									-3	snd		0		loose eggs
									-2	snd	elg	120		
									-2	snd	elg	7		
									-1	snd	elg	90		
									-1	gvl	fil	1		1k loose eggs on eelgrass
									0	snd	elg	10		
									0	snd	elg	6		
									1	mud			0	
									1	mud	elg		120	
									1	mud	elg		140	
									1	mud	elg		15	
									1	mud	elg		160	
									1	mud	elg		60	
									1	snd	elg		20	
									1	snd			0	
									2	snd			0	
									3	snd			0	
									4	snd	elg		0	
									5	snd	elg		30	
									5	snd	elg		1	
									7	snd	elg		0	
									9	snd			0	
									9	snd			0	
									9	snd			0	
									10	snd			0	
									10	snd			0	
									10	snd			0	
									11	snd			0	
									11	snd			0	
									12	snd			0	
									12	snd			0	
									12	snd			0	
									13	snd			0	
									13	snd			0	
									13	snd			0	
									13	snd			0	
									13	snd			0	
									14	cbl	lbk		40	
									14	cbl	lbk		90	
									14	cbl	lbk		70	
									14	cbl	lbk		90	
									14	cbl	lbk		100	
									14	cbl	lbk		60	
									14	cbl	lbk		20	
									14	cbl	lbk		25	
									15	cbl	lbk		40	
									15	cbl	lbk		15	
									15	cbl	lbk		50	
									16	cbl	lbk		20	
									16	cbl			0	
									16	cbl	lbk		5	
									17	cbl	lbk		80	
									17	cbl	lbk		40	
									17	cbl	lbk		40	

SITKA BOAT HARBOR HERRING SPAWN SURVEY 1993

17	cbl	lbk	15
18	cbl	lbk	20
18	cbl	lbk	15
21	cbl	lbk	10
21	cbl		0
22	cbl	lbk	10
22	cbl	lbk	5
24	cbl		0
25	cbl		0
26	cbl		0
28	cbl		0
31	snd		0
32	snd		0
33	snd		0
35	snd		0


1993 HERRING SPAWN
SITKA
PARTOFSHIKOF I.
Neva Pt.
Nakwasina Passage
HALLECK I.
KRUZOF I.
Pt. Mary
KRESTOF I.
Lisianski Pt.
Katlian Bay
Pt. Brown
MIDDLE I.
Halibut Pt.
SITKA
JAPONSKI I.
Silver Bay
Sholas Pt.
Sitka Pt.
LOW I.
ST. LAZARIA I.
LONG I.
Deep Inlet
Povorotni Pt.
SITKA SOUND
Redoubt Bay
PEISAR I.
Kanga Bay
BIORKA I.
NECKER ISLANDS
West
Crawfish Inlet
Crawfish Inlet
1
2
3
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26

SITKA #1 HERRING SPAWN DEPOSITION SURVEY 1993

DIVERS: Robert Larson (RL), Tim Minnicucci (TM), Bill Hughes (BH), Ed Grossman (EG)

ABVS: Bottom Typ boulder=bld, cobble=cbl, fir=fir, gravel=gvl, mud=mud, mussels-mus, rock= rck, sand=snd, shell or shell hash=shl, woody debris=wdy

Veg. Type: alaria=ala, agarum=agm, coraline algae=cor, eelgrass=elg, fillamentous=fil, fucus=fuc, hairkelp=hir, laminaria=lam, large brown kelp=lbk, leafy red=red, loose=los, macrocystis=mac ulva=ulv

DATE	TRA NO	TIME IN	TIME OUT	TOTA TIME	MAX DEPTH	DIVER NO.1	DIVER NO.2	INCREMENT (METERS)	DEPTH (FEET)	BOTTOM TYPE	VEG TYP	BDJ EYE	RL EYE	TM EYE	COMMENTS
13-Apr-93	1	1035	111	36	20	RL	BD	5	0	cbl	fuc		1		
									4	cbl	fil		2		
									7	gvl	lbk		35		bag #5 RL 35/ BD 25
									8	gvl	lbk		5		
									11	shl	hir		1		
									14	mud	lbk		3		
									15	mud	lbk		17		bag #18 RL 17/ BD 15
									10	mud	lbk		10		
									18	mud			5		
									20	mud			0		
									20	mud			0		
									20	mud			0		
									20	mud	lbk		20		
									20	mud	lbk		30		
									20	mud	lbk		20		
									19	mud	lbk		20		
									18	mud	lbk		15		
									18	mud	lbk		2		
									17	mud	lbk		25		
									17	mud	lbk		4		
									16	mud	lbk		3		
13-Apr-93	2	1040	1105	25	27	TM	BDJ	5	0	rck	fuc			15	eggs mostly dead to 20'
									-5	rck	fuc			80	
									-7	rck				0	
									4	cbl	fuc			35	
									5	cbl	elg			90	
									6	cbl	elg			45	
									9	mud	elg			20	
									9	mud	elg			15	
									10	mud				0	
									11	mud	lbk			3	
									13	mud				0	
									16	mud	lbk			70	
									17	mud	lbk			1	
									19	mud				0	
									20	mud				0	
									23	mud				0	
									24	mud	lbk			70	bag #A1 TM 70
									25	mud	lbk			140	
									25	mud	lbk			110	
									27	mud	lbk			90	
13-Apr-93	3	1141	1155	14	37	RL	BD	5	-6	cbl	fuc		12		
									-3	cbl	fuc		20		
									0	cbl	fuc		10		
									2	snd	fir		10		
									4	snd	elg		75		
									6	snd	lbk		35		
									7	snd	lbk		10		
									8	snd	lbk		65		
									9	gvl	lbk		180		
									11	rck	agm		35		bag #22 RL 225/ BD 320
									15	rck	agm		20		LBK, sample only
									18	rck	agm		40		
									22	rck	agm		80		bag #C RL 190/ BD 200
									26	rck	agm		30		LBK, sample only
									27	gvl	agm		10		
									32	rck			0		

SITKA #1 HERRING SPAWN DEPOSITION SURVEY 1993

									37	gvl			0		
13-Apr-93	4	1115	1135	20	38	TM	BDJ	5	0	rck	fuc			130	
									-7	rck	fuc			0	
									-9	rck				0	
									4	rck	rck			120	
									6	rck	lbk			20	
									7	rck	lbk			100	
									12	rck	lbk			35	
									16	rck				1	
									22	cbl	hir			50	bag #3 TM 50
									29	cbl				1	steep slope end
									38	cbl				0	of spawn
13-Apr-93	5	1244	1251	7	31	BD	RL	5	-1	rck	fuc		150		
									11	rck	lbk		50		
									21	rck	lbk		40		
									31	rck			0		
13-Apr-93	6	1200	1215	15	20	TM	RL	5	-6	rck	fuc	40			
									-2	rck	fuc	20			
									0	rck	fuc			0	
									3	rck	lbk			120	
									8	rck	lbk			90	
									13	cbl	lbk			20	
									17	cbl	lbk			8	
									19	snd	lbk			10	
									20	snd	lbk			20	
									20	mud				0	
									19	mud	lbk			3	
									16	snd	lbk			15	
13-Apr-93	7	1325			4	BD	RL	5	-4	rck	fuc		4		
									-2	cbl	fuc		3		
									2	mud	mud		0		
									3	mud	fuc		45		
									4	mud	elg		0		
									3	mud			0		
									3	mud			0		
									3	snd			0		
									3	snd	los		1		
									3	snd			0		
									3	snd			0		
									2	snd			0		
13-Apr-93	8	1315	1345	30	30	TM	BDJ	5	-6	rck	hir			200	
									-4	rck	fuc			100	
									-3	rck				0	
									0	rck				0	
									2	rck	hir			400	bag #5T TM 400+150 lost
									3	rck	hir			140	BDJ 500+200 lost
									4	snd	lbk			120	
									6	snd	hir			35	bag #31 TM 35
									7	snd	lbk			20	
									8	snd	hir			3	
									8	snd	lbk			100	
									12	snd	los			15	
									16	rck	lbk			80	
									20	mud				0	
									25	mud				0	
									30	mud				0	drops off fast
13-Apr-93	9	1405			34	RL	BD	5	0	gvl	fuc		0		
									1	gvl			0		
									3	gvl			0		
									4	cbl	lbk		20		
									6	cbl	lbk		160		
									7	gvl	lbk		300		
									6	rck	lbk		10		
									9	gvl	lbk		70		
									11	rck	lbk		80		

SITKA #1 HERRING SPAWN DEPOSITION SURVEY 1993

									14	shl	lbk	2		
									15	gvl	lbk	1		
									17	gvl		0		
									17	gvl	lbk	3		
									18	gvl	lbk	30		
									18	gvl	lbk	25		
									19	gvl	lbk	40		
									20	gvl	lbk	70		
									21	gvl	lbk	120		
									21	snd	lbk	80		
									21	snd	lbk	80		
									21	snd	lbk	35		
									22	snd	lbk	30		
									22	snd	lbk	60		
									22	mud		60		
									22	mud		0		
									22	mud		0		
									23	mud		6		
									23		lbk	4		
									23		lbk	10		
									21	rck		35		
									21	rck		15		
									21	rck		15		
									27	rck		10		
									30	rck		0		
									34	shl		0		
13-Apr-93	10	1400	1410	10	40	TM	BDJ	5	-8	rck	fuc		130	
									-6	rck	fuc		10	
									-1	rck	fuc		0	
									0	rck	fuc		0	
									3	rck			60	
									16	rck			50	
									23	snd	los		2	
									31	snd			0	
									40	snd			0	see to 60' steep
12-Apr-93	11				32	TM	BDJ	5	-8	rck			0	
									-5	rck			0	
									12	rck	lbk		0	
									26	rck	lbk		0	heavy surge
									29	rck			0	
									32	rck			0	
									32	rck			0	
12-Apr-93	12					TM	BD	5	0	rck	fuc		0	
									-7	rck	fuc		0	
									12	cbl	los		2	
									12	cbl	los		2	
									13	cbl	lbk		5	
									15	cbl	los		2	
									15	cbl	los		5	
									15	cbl	lbk		20	loose
									16	cbl	lbk		10	loose
									17	cbl	lbk		25	loose
									18	cbl	lbk		30	loose
									18	cbl	lbk		5	loose
									20	cbl	lbk		20	loose
									21	cbl	lbk		35	loose
									21	cbl	lbk		15	loose
									21	cbl	los		3	
									22	cbl	los		4	
									23	cbl	lbk		7	
									24	cbl	los		1	
									25	cbl	los		1	
									26	cbl	los		1	
									27	cbl	los		1	
									27	cbl			0	

SITKA #1 HERRING SPAWN DEPOSITION SURVEY 1993

									28	cbl			0	
									28	cbl			0	
									30	cbl			0	
									30	cbl			0	
12-Apr-93	14	1315	1655	40	32	RL	BDJ	5	5	rck	fil	0		
									15	rck		40		
									15	shl	lbk	10		
									18	shl	lbk	60		
									21	shl	lbk	25		
									23	shl	lbk	7		
									27	shl	lbk	8		
									29	snd		0		
									32	snd		0		
11-Apr-93	16	NA	NA	NA	38	RL	BH	5	3	cbl		0		from 0'
									5	bld		0		
									7	cbl	los	1		
									8	cbl	fil	40		
									8	cbl	fir	55		
									8	snd	elg	360		
									10	snd	elg	380		
									11	snd	elg	120		
									12	snd	elg	5		
									13	gvl	lbk	3		
									13	cbl	lbk	10		
									13	cbl		8		
									15	gvl	elg	90		
									15	gvl	hir	100		
									10	snd		0		
									17	snd	los	1		
									17	snd		0		
									18	snd		0		
									18	snd		0		
									19	snd	los	2		
									20	snd		0		
									20	snd		0		
									20	rck		0		
									17	rck	lbk	2		
									26	rck	agm	60		
									28	snd	lbk	2		
									29	snd		0		
									31	snd		0		
									33	snd		0		
									36	snd	lbk	1		
									38	snd		0		
12-Apr-93	17	1035	1105	30	25	RL	BDJ	5	-3	rck	fuc	30		
									0	rck	fuc	80		
									3	rck	lbk	40		
									4	rck	lbk	25		
									6	gvl	lbk	10		
									7	gvl	lbk	5		
									10	gvl	los	2		
									12	gvl	los	3		
									14	gvl	los	2		
									15	gvl	los	3		
									17	gvl	los	2		
									19	gvl	los	1		
									22	gvl	los	2		
									23	gvl	los	1		
									24	gvl		0		
									25	gvl		0		
									25	snd		0		truncated softshell
									25	snd		0		clams
12-Apr-93	18			6	39	TM	BD	5	0	rck	fuc		100	
									3	rck	los		0	
									5	rck	los		1	

SITKA #1 HERRING SPAWN DEPOSITION SURVEY 1993

								18	rck			1	
								32	rck			0	
								39	rck			0	
12-Apr-93	19			7	38	TM	BD	5	0	rck	fuc	40	
									6	rck		0	
									13	rck		50	
									19	rck	lbk	40	
									28	rck	lbk	20	
									38	cbl		0	steep drop see to 45+
12-Apr-93	20	1207	1225	18	34	RL	BDJ	5	-5	rck	fuc	40	
									-1	rck	fil	280	
									1	rck	fir	100	
									3	gvl	los	20	
									4	gvl	los	25	
									6	gvl	lbk	25	
									8	gvl	lbk	210	
									10	gvl	lbk	150	
									12	gvl	lbk	160	
									12	gvl	lbk	50	
									15	gvl	lbk	100	
									19	gvl	lbk	120	
									22	shl	los	100	
									26	rck	lbk	10	
									30	shl	los	2	cucs start
									31	snd		0	
									34	rck		0	
12-Apr-93	21	1300	1320	20	34	RL	BDJ	5	0	rck	fir	70	
									3	rck	lbk	160	
									5	cbl	lbk	110	
									5	cbl	los	50	
									5	cbl	hir	1100	
									5	cbl	lbk	90	
									10	cbl	lbk	210	
									10	cbl	lbk	110	
									10	cbl	lbk	85	
									10	cbl	lbk	25	
									19	snd	lbk	0	
									21	snd	lbk	0	
									25	shl		0	
									27	snd	lbk	3	first cuc
									31	snd	lbk	0	
									34	snd		0	
12-Apr-93	22				36	TM	BD	5	0	rck		0	
									8	rck	fuc	0	
									10	rck	lbk	0	
									13	rck	lbk	5	
									18	rck		50	
									20	snd	los	1	
									24	rck	lbk	25	
									26	cbl	lbk	2	
									28	cbl		1	
									30	cbl		1	
									33	cbl		0	see to 40'
									36	cbl		0	end of spawn
11-Apr-93	23	1640	1651	11	40	RL	BH	5	3	rck	fuc	65	from 0'
									6	rck	fir	40	
									13	rck	ulv	0	
									17	cbl		0	
									17	rck	lbk	0	
									17	rck	lbk	0	
									17	rck		0	
									19	rck		0	red urchin
									23	rck		20	
									31	rck	lbk	50	
									35	rck		0	

SITKA #1 HERRING SPAWN DEPOSITION SURVEY 1993

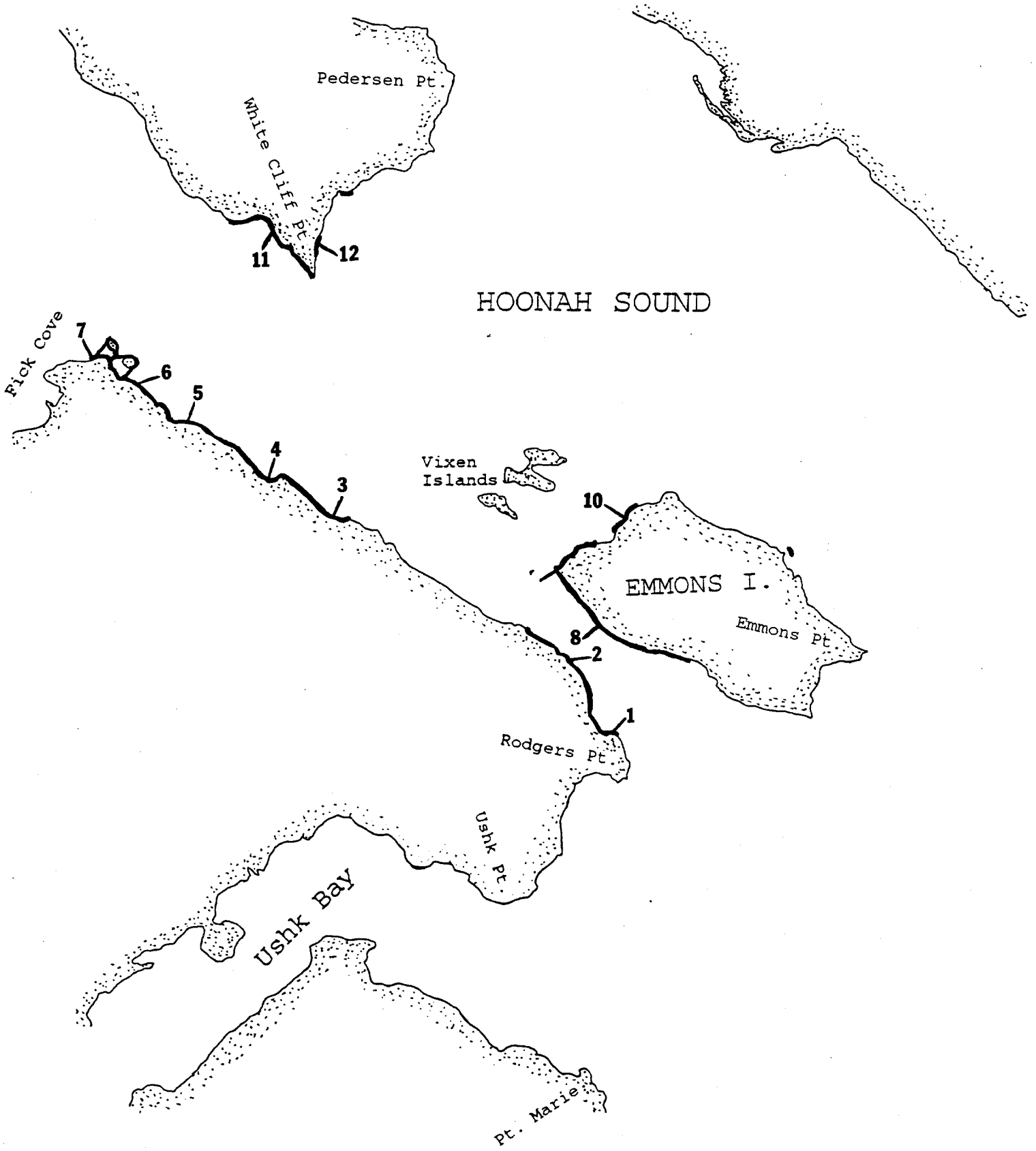
									40	cbl		0		
12-Apr-93	24	1559	1615	16	33	RL	BH	5	2	cbl	los	1		from 0'
									4	cbl	los	7		
									6	cbl	fir	130		
									7	snd	elg	240		
									9	rck	lbk	35		
									11	snd	elg	60		
									13	snd	elg	100		
									15	snd	elg	50		
									17	gvl	lbk	30		
									20	snd	lbk	10		
									22	snd	lbk	25		
									26	snd		0		no vegetation
									29	mud		0		
									33	mud		0		
11-Apr-93	25	1340	1420	40	35	TM	EG	5	-7	rck	fuc		10	
									-5	rck			20	
									-4	rck			10	
									-3	rck	fuc		30	
									-2	rck			0	
									-1	rck			0	
									0	rck			0	
									2	cbl	hir		180	
									2	cbl	fuc		120	
									4	rck	fuc		90	
									5	cbl			10	
									5	cbl	lbk		60	
									5	cbl	lbk		240	
									5	cbl	lbk		280	
									5	cbl	lbk		160	
									8	cbl	lbk		140	
									9	cbl	lbk		200	
									9	cbl	lbk		160	
									9	cbl	lbk		160	
									9	rck			10	
									9	cbl	lbk		120	
									7	rck	lbk		40	
									6	rck			40	
									6	rck			20	
									7	rck	lbk		90	
									9	rck			120	
									10	rck	lbk		70	
									12	rck	lbk		30	
									13	cbl	lbk		30	
									15	cbl	lbk		5	
									17	cbl	lbk		90	
									17	rck			80	
									20	rck			40	
									25	cbl			0	
									28	cbl			0	
									30	cbl			0	
									35	cbl			0	
11-Apr-93	26	1255	1310	15	38	TM	EG	5	-8	cbl	fuc		1	50 meters to tree line
									-8	cbl	fuc		1	
									-8	cbl	fuc		5	
									-8	cbl	fuc		10	
									-8	cbl	fuc		3	
									-8	cbl	fuc		3	
									-8	cbl	fuc		10	
									-8	cbl	fuc		2	
									-8	cbl	fuc		5	
									-8	cbl	fuc		10	
									-8	cbl	fuc		1	
									-8	cbl	fuc		10	
									-8	cbl	fuc		5	

SITKA #1 HERRING SPAWN DEPOSITION SURVEY 1993

-8	cbl	fuc	20
-7	cbl	fuc	10
-6	cbl	fuc	0
-5	cbl	fuc	1
-4	cbl	fuc	1
-4	cbl	fuc	30
-3	cbl	fuc	60
-2	cbl	fuc	5
-2	cbl	fuc	0
-2	cbl	fuc	20
-2	cbl	fuc	0
-2	cbl	fuc	0
-2	cbl	fuc	0
-2	cbl	fuc	0
-2	cbl	fuc	0
-2	cbl	fuc	0
-2	cbl	fuc	0
-2	cbl	fuc	0
-2	cbl	fuc	0
-2	cbl	fuc	0
-2	cbl	fuc	0
-2	cbl	fuc	0
-2	cbl	fuc	0
-2	cbl	fuc	0
-2	cbl	fuc	0
-2	cbl	fuc	0
-2	cbl	fuc	0
-2	cbl	fuc	0
-2	cbl	fuc	0
-2	cbl	fuc	0
2	snd	fuc	0
2	snd	fuc	0
2	snd	fuc	0
2	snd	fuc	0
2	snd	fuc	0
2	snd	fuc	0
2	cbl	fil	0
2	cbl	fil	0
2	cbl	fil	0
2	cbl	fil	0
2	cbl	fil	0
2	cbl	fil	0
4	cbl	fil	0
4	cbl	fil	0
4	cbl	fil	0
4	cbl	fil	0
4	cbl	fil	0
9	mud		0
14	mud		0
19	mud		0
24	mud		0
29	mud		0
38	mud		0

Note: Transect #15 Data sheet lost.
Note: No Transect #13 due to darkness

1993 HERRING SPAWN
HOONAH SOUND



HOONAH SOUND HERRING SPAWN SURVEY 1993

DIVERS: Robert Larson (RL), Tim Minicucci (TM), Will Bergmann (WB), Don Ingledue (DI), Bill Davidson (BD)

ABVS: Bottom Typ boulder=bld, cobble=cbl, fir=fir, gravel=gvl, mud=mud, mussels-mus, rock= rck, sand=snd, shell or shell hash=shl, woody debris=wdy

Veg. Type: alaria=ala, agarum=agm, coraline algae=cor, eelgrass=elg, fillamentous=fil, fucus=fuc, hairkelp=hir, laminaria=lam, large brown kelp=lbk, leafy red=red, loose=los, macrocystis=mac ulva=ulv

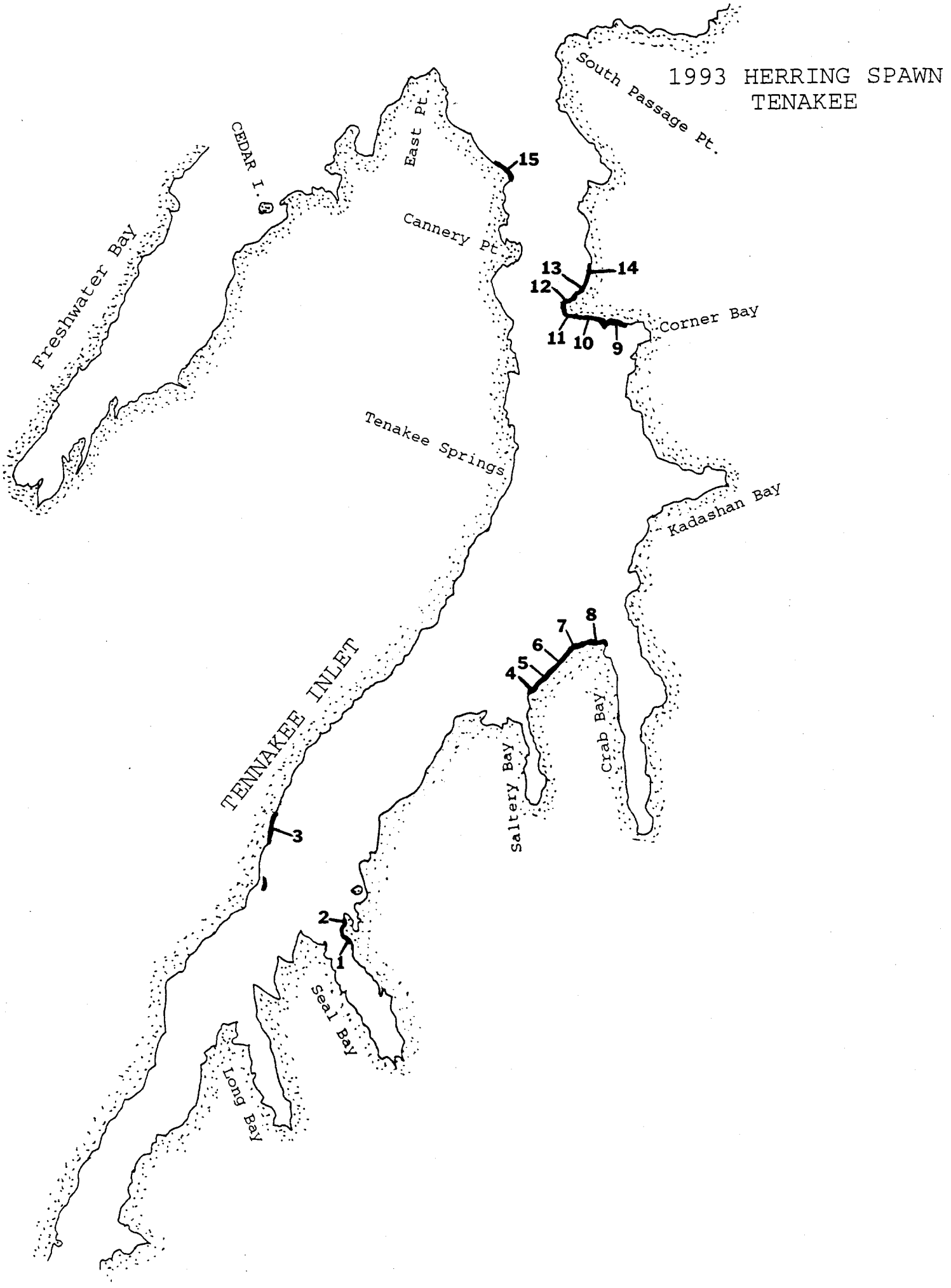
DATE	TRAN NO	TIME IN	TIME OUT	TOTAL TIME	MAX DEPT	DIVE NO.1	DIVE NO.2	INCREMEN (METERS)	DEPTH (FEET)	BOTTOM TYPE	VEG TYP	RL EYE	TM EYE	WB EYE	COMMENTS
06-May-93	1	1200	1221	21	36	WB	DI	5	2	rck	fuc			0	5 meters from 0'
									3	rck				0	mussels
									5	cbl				0	
									6	rck	fuc			0	
									7	rck	ulv			0	
									8	bld				0	
									9	rck	ulv			0	
									12	bld				0	
									14	bld				0	20 3" green urchins/m2
									15	cbl	agm			65	
									17	cbl	lbk			7	sparse veg, good dep
									18	snd				0	
									18	snd				0	
									18	snd				0	
									20	snd	los			1	
									21	snd				0	
									22	snd	hir			340	
									24	snd	lbk			20	
									27	snd	lbk			1	
									28	snd	lbk			1	1 male 7" red king
									30	snd	lbk			1	
									32	snd	lbk			3	
									34	snd				0	
									36	snd				0	3 cucs
06-May-93	2	1232	1245	13	32	RL	DI	5	2	gvl	los	40			from 0'
									5	gvl	los	30			
									6	gvl	los	12			
									6	gvl	los	20			
									5	gvl	los	2			
									3	gvl		0			
									4	gvl		0			
									7	gvl		0			
									10	gvl	fuc	0			
									12	gvl	fuc	0			
									15	gvl	fuc	0			
									18	gvl	lbk	2			
									25	gvl		0			
									32	gvl		0			good numbers of cucs
06-May-93	3	1746	1756	10	35	TM	BD	5	1	cbl	fuc		0		from 0'
									2	cbl	fuc		0		
									3	cbl	fir		2		
									3	cbl	fir		5		
									3	cbl	fir		5		
									7	cbl	fir		15		
									8	cbl	fir		3		
									9	cbl	fir		15		
									10	cbl	elg		15		
									11	snd	elg		50		
									12	snd	elg		15		
									15	snd	elg		0		

HOONAH SOUND HERRING SPAWN SURVEY 1993

									17	snd		0	
									20	snd		0	
									22	snd		0	
									25	snd		0	
									30	snd		0	
									35	snd		0	
06-May-93	4	1806	1812	6	40	TM	BD	5	-3	rck		0	
									0	rck		0	
									2	rck		0	
									3	rck		0	
									4	rck	ulv	0	
									5	rck	ulv	0	
									5	rck	ulv	0	
									5	rck	lbk	30	
									7	snd	fir	5	
									7	snd		0	
									7	snd		0	
									9	snd		0	
									12	snd		0	
									18	snd		0	
									24	snd		0	
									30	snd		0	
									40	snd		0	
06-May-93	5	1815	1826	11	29	WB	DI	5	-1	cbl	fuc	10	35 meters to MHHW
									1	cbl	fuc	4	
									2	cbl	fuc	2	
									4	cbl	fuc	33	
									5	cbl	fir	30	
									8	cbl	fir	260	
									9	cbl	lbk	20	
									16	cbl	lbk	2	
									22	snd	lbk	0	
									29	snd	lbk	0	no urchins, 4 cucs
06-May-93	6	1740	1801	21	33	RL	WB	5	3	gvl	0		20 meters from 0'
									5	gvl	10		
									6	gvl	0		
									7	gvl	1		
									8	gvl	red	15	
									9	gvl	red	18	
									10	gvl	fir	6	
									11	snd	red	8	
									12	snd	0		
									14	snd	0		
									19	snd	los	1	
									25	snd	0		
									28	snd	los	80	
									30	snd	los	40	
									31	snd	los	1	
									32	snd	los	1	
									32	snd	lbk	1	
									32	mud	fuc	35	loose
									32	mud	fuc	40	loose
									33	snd	3		
06-May-93	7	1718	1726	8	36	RL	DI	5	-6	gvl		23	from MHHW
									-3	gvl	los	140	
									-2	gvl	los	0	
									0	gvl	los	2	
									2	gvl	los	0	

								4	gvl		0		
								7	gvl	ulv	0		
								9	gvl	fil	0		
								10	gvl	fil	0		
								14	gvl	fil	0		
								20	gvl	fil	0		
								25	gvl		0		
								32	gvl		0		
								36	gvl		0		
06-May-93	8	1141	1147	6	30	RL	WB	5	1	cbl			0	25 meters to MHHW
									3	cbl			0	
									4	cbl			0	
									7	cbl	fuc		25	
									8	snd			0	
									12	snd			0	
									14	snd			0	
									20	snd			0	
									25	snd			0	
									30	snd			0	no cucs, no urchins
06-May-93	9	1117	1131	14	30	RL	DI	5	2	gvl	fuc	0		5m from shore
									3	gvl		0		
									4	gvl		0		
									5	snd		0		
									6	gvl	fuc	0		
									6	gvl	fuc	0		
									7	gvl	fuc	0		
									7	gvl		0		
									8	gvl		0		
									8	gvl	fil	0		
									8	gvl	fil	0		
									9	gvl	fil	0		
									9	gvl	red	0		
									11	gvl	red	0		
									11	gvl	lbk	7		
									12	gvl	lbk	3		
									13	gvl	hir	15		
									16	gvl	lbk	20		
									19	gvl	lbk	1		
									22	gvl	lbk	15		
									26	snd	lbk	1		
									30	snd	los	1		sand deeper
06-May-93	10	1047	1104	17	21	WB	DI	5	-8	gvl	fuc	0		30 meters from MHHW
									-8	gvl	fuc	0		
									-7	gvl	fuc	0		
									-7	gvl	fuc	10		
									-6	gvl	fuc	15		
									-5	gvl	fuc	0		
									-4	gvl	fuc	25		
									-3	gvl	fuc	50		
									-2	gvl	fuc	90		
									-1	gvl		0		
									0	gvl	fuc	30		
									1	gvl	fuc	25		
									1	gvl			0	
									2	gvl			0	
									3	gvl	fuc		0	
									4	gvl			0	
									4	gvl			0	

									4	gvl		0	
									5	gvl		0	
									5	gvl		0	
									6	gvl		0	
									6	gvl	fuc	1	
									6	gvl	fil	0	
									7	mud		0	
									7	mud		0	
									7	snd		0	
									7	snd		0	
									8	snd	elg	0	
									8	snd	elg	1	
									9	snd	lbk	20	
									10	snd	elg	20	
									10	snd	elg	2	
									11	snd	lbk	25	
									11	snd	lbk	10	
									13	snd	lbk	30	
									14	snd	lbk	2	
									15	snd	lbk	0	
									15	snd	lbk	0	
									15	snd	lbk	0	
									16	snd	lbk	0	
									17	snd	lbk	0	
									18	snd	lbk	0	
									17	snd	lbk	0	
									18	snd	lbk	0	
									19	snd	lbk	0	
									18	snd	lbk	0	
									21	snd	lbk	0	no urchins, no cucs
06-May-93	11	1645	1659	14	29	WB	DI	5	2	cbl		0	5 meters to MHHW
									4	cbl		0	
									5	rck	fuc	1	
									7	cbl	fuc	0.5	
									10	cbl	fuc	2	
									10	cbl	fil	0	
									13	cbl	lbk	0	
									16	snd	elg	0	
									18	cbl	lbk	0	
									21	cbl	lbk	0	
									24	cbl	hir	0	
									26	cbl	lbk	0	
									29	snd	lbk	0	5 cucs, no urchins
06-May-93	12	1621	1629	8	38	RL	WB	5	2	rck	fuc	0	50 meters to MHHW
									15	rck	fir	50	
									18	rck	hir	120	
									28	rck	lbk	70	
									38	rck	lbk	0	no cucs, no urchins


1993 HERRING SPAWN
TENAKEE
South Passage Pt.
East Pt.
CEDAR I.
Freshwater Bay
Cannery Pt
15
13
14
12
11
10
9
Corner Bay
Tenakee Springs
Kadashan Bay
8
7
6
5
4
TENNAKEE INLET
Saltery Bay
Crab Bay
3
2
1
Seal Bay
Long Bay

TENAKEE INLET HERRING SPAWN SURVEY 1993

ABVS: Bottom Typ boulder=bld, cobble=cbl, fir=fir, gravel=gvl, mud=mud, mussels-mus, rock= rck, sand=snd, shell or shell hash=shl, woody debris=wdy

Veg. Type: alaria=ala, agarum=agm, coraline algae=cor, eelgrass=elg, fillamentous=fil, fucus=fuc, hairkelp=hir, laminaria=lam, large brown kelp=lbk, leafy red=red, loose=los, macrocystis=mac ulva=ulv

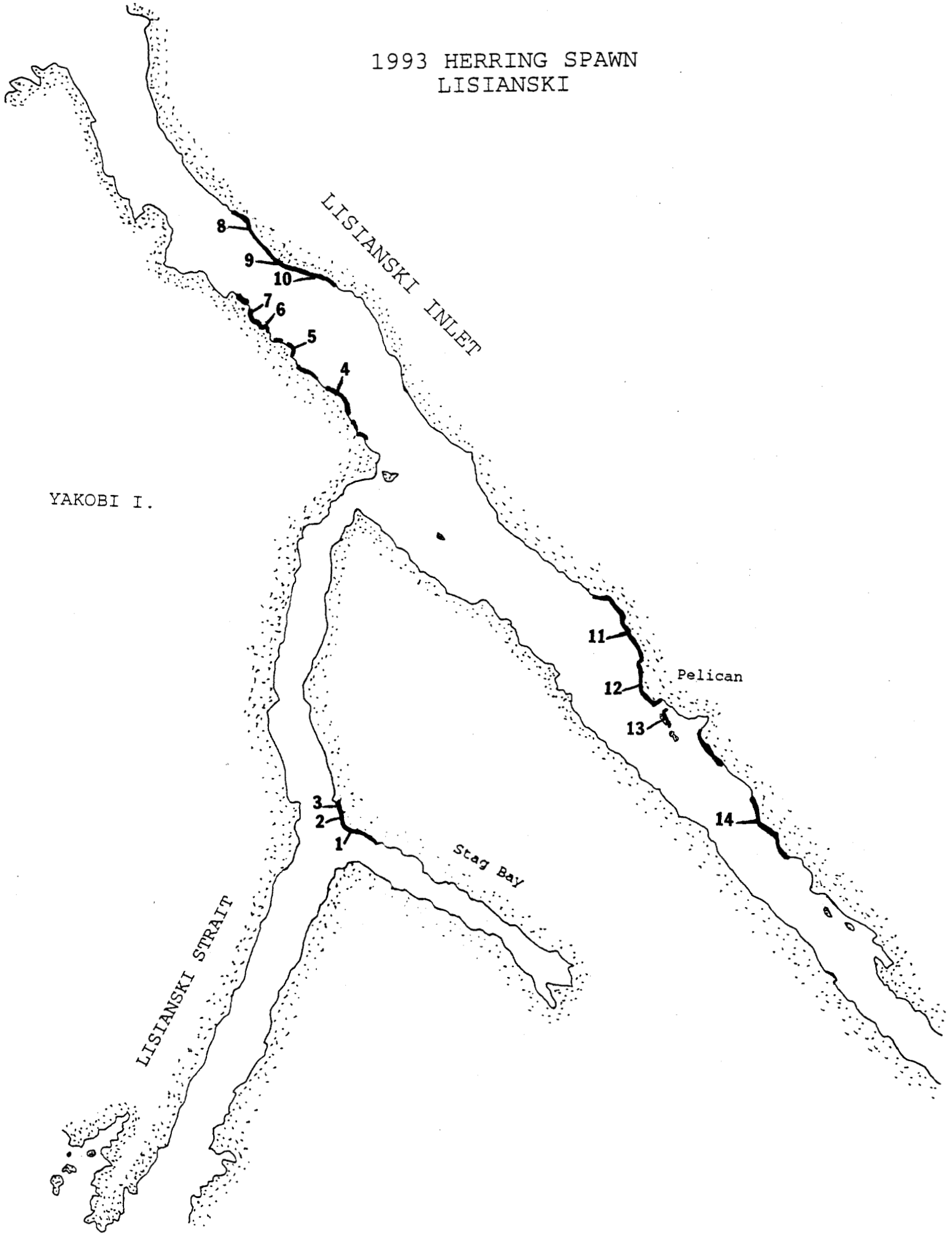
DATE	TRAN NO	TIME IN	TIME OUT	TOTAL TIME	MAX DEPT	DIVE NO.1	DIVE NO.2	INCREMENT (METERS)	DEPTH (FEET)	BOTTOM TYPE	VEG TYP	RL EYE	TM EYE	WB EYE	DI EYE	COMMENTS
07-May-93	1	1337	1343	6	36	WB	DI	5	7	rck	fuc			1		from MHHW
									17	rck	fuc			20		2 cucs
									28	rck	fuc			0		
									36	rck	fuc			0		
07-May-93	2	1354	1401	7	31	WB	DI	5	3	rck	fuc			0		
									5	rck	fuc			0		
									6	rck	fuc			0		
									8	rck	fuc			0		
									9	rck	fuc			0		
									14	rck	fil			0		1 cuc
									22	snd	lbk			0		1 cuc
									31	snd	lbk			0		18-32ft 0.3 cucs/m2
07-May-93	3	1417	1427	10	31	WB	DI	5	4	gvl				0		10m to MHHW
									6	cbl				0		
									7	cbl	fuc			0		
									9	cbl	fuc			0		1 green urchin
									11	cbl				0		
									12	cbl				0		
									13	cbl				0		
									15	cbl				0		
									16	cbl	ala			0		
									18	cbl	hir			300		
									22	snd	elg			2		
									26	snd	lbk			0		no cucs
									31	snd				0		lots of butter clams
07-May-93	4	1343	1408	25	34	TM	BD	5	3	cbl	fuc		0			from MHHW
									5	cbl	fuc		0			
									5	cbl	fuc		1			
									7	cbl	fuc		0			
									9	cbl	fuc		0			
									10	cbl	fuc		2			
									11	cbl	fir		2			
									11	cbl	shl		0			
									11	cbl	fir		1			
									11	cbl	fir		1			
									12	cbl	fir		3			
									13	cbl	fir		0			
									13	cbl	fir		0			
									15	cbl	fir		5			bag #5 TM 4+1 lost
									17	cbl	fuc		15			/BD 2+1 lost
									18	cbl	fuc		5			
									19	snd	elg		0			
									20	snd	elg		1			
									21	snd	elg		1			
									22	snd	lbk		1			
									22	snd	lbk		15			bag #26 TM 14+1 lost
									24	snd	lbk		4			/BD 14+1 lost
									24	snd			0			
									25	snd			0			
									25	snd			0			
									28	snd			0			

									30	snd		0		
									31	snd		0		
									31	snd		0		
									31	snd		0		
									31	snd		0		2 cucs
									31	snd		0		1 cuc
									31	snd		0		4 cucs
									32	snd		0		6 cucs
									33	snd		0		5 cucs
									34	snd		0		3 cucs
07-May-93	5	1437	1451	14	40	TM	BD	5	10	cbl	fuc	0		from MHHW
									11	cbl		0		
									10	rck		0		mussels
									12	rck	fuc	1		
									12	rck	fuc	2		
									16	rck	fuc	20		bag #11 TM 17+3
									17	rck	fuc	5		lost/BD 9+3 lost
									19	rck	fir	1		
									20	snd	elg	1		
									21	snd	elg	1		
									23	snd		0		
									25	snd		0		
									30	snd		0		
									34	snd		0		
									37	snd		0		7 cucs
									40	snd		0		
07-May-93	6	1504	1515	11	39	TM	BD	5	7	cbl		0		from MHHW
									8	cbl	fuc	0		
									10	cbl	fuc	1		
									11	cbl	fuc	0		
									13	cbl		0		mussels
									15	cbl	hir	0		
									17	cbl	ulv	1		
									20	cbl	ala	20		bag #Z TM 18+2
									24	cbl	hir	3		lost/BD 13+2 lost
									30	cbl	lbk	0		
									37	cbl	lbk	0		
									39	cbl	lbk	0		
07-May-93	7	1537	1600	23	56	TM	BD	5	13	rck	fuc	0		from MHHW
									14	cbl	fuc	0		
									16	cbl		0		
									17	cbl	ala	0		lost/BD 9+1 lost
									20	cbl	hir	7		bag #21 TM 6+1
									23	cbl	hir	25		bag #1 TM 23+2
									24	snd		0		lost/BD 33+2 lost
									26	snd		0		
									30	snd	hir	0		
									32	snd	lbk	0		
									33	snd	lbk	0		
									35	snd	lbk	0		
									37	snd	lbk	0		
									40	snd	lbk	0		observed to 56'
07-May-93	8	1537	1600	23	56	WB	DI	5	-1	cbl	elg		0	from MHHW
									14	bld	ulv		0	
									15	cbl	fir	20		
									17	snd			1	
									18	snd	ulv	18		
									18	snd	ulv		5	

									20	snd	ulv			0	
									22	snd	ulv			0	
									25	snd	ulv			0	
									26	snd	ulv			0	
									29	snd				0	one cuc
									32	snd				0	
									34	snd	lbk			0	
08-May-93	9	903	924	21	38	TM	WB	5	-6	snd			0		from MHHW
									-5	snd	fuc		5		
									-4	rck			0		
									-3	rck			0		
									-2	cbl			0		
									-1	cbl	fuc		2		
									0	cbl	elg		0		
									2	mud	los		7		.2 cucs/m2
									3	mud	los		2		.2 cucs/m2
									4	mud	los		3		.2 cucs/m2
									6	gvl	los		1		.5 cucs/m2
									10	gvl	los		10		.1 cuc/m2
									12	gvl			0		
									14	gvl	lbk		11		
									15	gvl			0		
									16	gvl	lbk		3		
									18	gvl	lbk		0		
									20	gvl	lbk		0		
									23	gvl	agm		0		
									25	gvl	lbk		0		
									28	gvl	lbk		0		
									30	gvl	lbk		0		.2 cucs/m2
									32	gvl			0		
									36	gvl			0		
									38	gvl			0		
08-May-93	10	914	926	12	36	BD	DI	5	-13	gvl		0			
									-12	gvl		8			
									-11	gvl	fuc	8			
									-10	gvl	fuc	10			
									-8	gvl	fuc	6			
									-6	gvl	fuc	5			
									-6	gvl	fuc	20			
									0	cbl	fir	35			
									2	snd	lbk			40	bag #22 DI 39+1 lost
									7	snd				0	
									13	gvl	lbk			30	
									20	cbl	lbk			8	
									25	snd	lbk			5	
									29	snd	lbk			0	
									36	snd				0	few cucs
08-May-93	11	948	1002	14	44	TM	DI	5	-13	gvl		0			from MHHW
									-12	rck	fuc	20			
									-11	gvl		0			
									-10	gvl	fuc	7			
									-9	gvl	fuc	12			
									-7	gvl	fuc	10			
									-5	gvl	fuc	45			
									-2	gvl	fuc	140			
									2	gvl	lbk		90		
									6	gvl	lbk		15		
									10	gvl	lbk		40		bag no tag blue

TENAKEE INLET HERRING SPAWN SURVEY 1993

									14	gvl	lbk	45			TM 39+1 lost/
									19	gvl	lbk	4			DI 29+1 lost
									25	rck	lbk	0			
									32	rck	lbk	25			
									38	rck		0			
									44	rck		0			
08-May-93	12	1014	1038	24	48	WB	BD	5	-15	rck			0		5m to MHHW
									-12	cbl			0		
									-10	cbl			1		mussels
									-9	rck			0		
									-8	rck	fuc		1		
									-7	rck	fuc		3		/BD 22+18 lost
									-4	rck	fuc		68		bag #34 WB 28+40 lost
									0	rck	fir		260		bag #17 WB 220+40 lo
									2	snd	los		27		/BD 110+40 lost
									3	snd	los		20		samples out of transect
									4	snd	lbk		20		#7 480+20 lost
									5	snd	los		90		#3 380+20 lost
									7	snd	lbk		2		
									10	snd	lbk		0		
									12	snd	hir		0		
									14	snd	lbk		0		
									17	snd	lbk		0		
									20	snd	lbk		0		lg male king crab
									24	snd	lbk		0		.2 cucs/m2
									27	snd			0		observed to 48'
08-May-93	13	1028	1039	11	40	DI	TM	5	-7	gvl				5	30m from MHHW
									-5	gvl	fuc			30	
									-2	gvl	fir			35	
									1	snd	ulv			0	
									3	snd				0	
									14	snd				0	
									19	snd				0	
									25	snd				0	2 cucs
									30	snd				0	5 cucs
									34	snd				0	
									40	snd				0	
08-May-93	14	1051	1104	13	32	DI	TM	5	-5	gvl				0	60m to MHHW
									-3	gvl	ala			0	
									0	gvl	ala			0	
									2	gvl	lbk			0	
									4	gvl	lbk			20	
									5	gvl	lbk			4	
									8	rck	lbk			1	
									10	rck	lbk			0	
									20	rck	lbk			0	
									26	snd	lbk			0	
									32	snd	lbk			0	
08-May-93	15	1100	1116	16	35	WB	BD	5	0	gvl	lbk		4		25m to MHHW
									3	rck	hir		80		bag no# 65+15 lost
									8	gvl	hir		220		
									13	snd	hir		2		cucs to 25'
									19	snd	lbk		0		
									25	snd	lbk		0		
									35	snd	lbk		0		


1993 HERRING SPAWN
LISIANSKI
LISIANSKI INLET
YAKOBI I.
LISIANSKI STRAIT
Stag Bay
Pelican
1
2
3
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14

LISIANSKI INLET AND STRAIT HERRING SPAWN SURVEY 1993

DIVERS: Robert Larson (RL), Tim Minicucci (TM), Will Bergmann (WB), Don Ingledue (DI), Bill Davidson (BD)

ABVS: Bottom Typ boulder=bld, cobble=cbl, fir=fir, gravel=gvl, mud=mud, mussels-mus, rock= rck, sand=snd, shell or shell hash=shl, woody debris=wdy

Veg. Type: alaria=ala, agarum=agm, coraline algae=cor, eelgrass=elg, fillamentous=fil, fucus=fuc, hairkelp=hir, laminaria=lam, large brown kelp=lbk, leafy red=red, loose=los, macrocystis=mac ulva=ulv

DATE	TRAN NO	TIME IN	TIME OUT	TOTAL TIME	MAX DEPT	DIVE NO.1	DIVE NO.2	INCREMENT (METERS)	DEPTH (FEET)	BOTTO TYPE	VEG TYP	RL EYE	TM EYE	COMMENTS
09-May-93	1	1152	1209	17	49	TM	BD	5	-3	rck			4	from MHHW
									-3	rck	fuc		3	
									-1	rck	fir		10	
									3	rck	ala		60	
									4	rck			45	
									7	rck	fuc		30	
									10	snd	lbk		4	loose eggs
									13	snd	los		1	
									16	snd	hir		2	
									19	snd	lbk		0	dead eggs
									23	snd	los		1	
									27	snd	hir		180	bag #31 TM 210+10 lost
									31	snd	lbk		0	/BD 240+10 lost, this
									35	snd	lbk		0	count for sample only
									39	snd	los		20	
									44	snd	los		20	
									49	snd			0	hatching occuring
09-May-93	2	1223	1230	7	44	TM	BD	5	-3	rck			0	from MHHW
									-2	rck	fuc		22	hatching occuring
									2	rck	ala		5	dead eggs
									4	rck	lbk		5	
									14	rck	lbk		5	
									18	rck	lbk		1	
									26	rck	lbk		0	
									32	snd	hir		0	
									36	snd	lbk		0	
									44	snd	lbk		0	
09-May-93	3	1241	1247	6	36	TM	BD	5	-3	rck			0	from MHHW
									0	rck	hir		3	
									3	rck	lbk		1	
									9	rck	lbk		25	
									15	rck	lbk		0	
									22	snd	lbk		0	
									30	snd	lbk		0	
									36	snd	lbk		0	
09-May-93	4	1315	1320	5	40	TM	BD	5	-3	rck			0	from MHHW
									2	rck	fuc		8	hatching occuring
									4	rck	lbk		2	
									11	rck	lbk		60	
									15	rck	lbk		0	
									20	cbl	lbk		0	
									30	cbl	lbk		0	
									32	cbl	lbk		0	
									40	cbl	lbk		0	
09-May-93	5	1331	1341	10	32	TM	BD	5	-2	rck	fuc		0	from MHHW
									2	rck	fuc		0	
									4	cbl	hir		1	
									6	cbl	lbk		20	
									7	cbl	lbk		30	
									8	cbl	lbk		13	

									11	cbl	lbk	10	
									12	cbl	lbk	0	
									16	cbl	lbk	3	
									20	cbl	lbk	0	
									21	cbl	lbk	0	
									23	cbl	lbk	0	
									26	cbl	lbk	0	
									27	cbl	lbk	0	
									32	cbl	lbk	0	
09-May-93	6	1356	1402	6	39	TM	BD	5	-2	rck		0	from MHHW
									2	rck	fuc	0	
									3	rck	lbk	0	
									6	rck	lbk	0	
									8	rck	lbk	0	
									13	rck	lbk	0	
									17	rck	lbk	0	
									25	rck	lbk	0	
									30	rck	lbk	0	
									35	rck	lbk	0	
									39	rck	lbk	0	
09-May-93	7	1400	1409	9	39	RL	DI	5	-4	rck		0	3 meters to MHHW
									0	rck	fuc	4	
									3	rck	fuc	12	
									10	rck	lbk	40	
									10	snd	lbk	5	
									13	snd	lbk	15	
									18	snd	lbk	4	
									20	snd	lbk	3	
									23	cbl	lbk	0	
									26	cbl	lbk	0	
									32	cbl	lbk	0	
									36	cbl	lbk	0	
									39	cbl		0	
09-May-93	8	1314	1324	10	49	RL	DI	5	2	rck	ulv	0	from -3'
									10	rck	lbk	60	
									15	rck	lbk	40	
									21	shl	hir	0	
									23	rck	agm	15	
									28	rck	agm	25	
									40	gvl		0	
									49	gvl		0	no cucs observed
09-May-93	9	1247	1256	9	40	RL	DI	5	-3	cbl	fuc	12	from MHHW
									1	cbl	fuc	10	
									3	cbl	ala	3	
									5	cbl	lbk	90	
									6	cbl	lbk	50	
									12	cbl	lbk	30	
									17	cbl	lbk	15	
									31	rck	lbk	0	
									40	rck	lbk	0	
09-May-93	10	1225	1233	12	25	RL	DI	5	-7	cbl	fuc	0	from MHHW
									-2	cbl	fuc	7	
									1	cbl	fuc	10	
									3	cbl	lbk	2	
									5	cbl	hir	20	
									10	cbl	lbk	1	
									14	cbl	lbk	0	
									19	cbl	lbk	0	1 cuc observed

LISIANSKI INLET AND STRAIT HERRING SPAWN SURVEY 1993

									25	cbl		0	
09-May-93	11	1152	1154	2	20	RL	DI	5	-4	cbl	fuc	17	from MHHW
									0	cbl	fuc	0	
									3	gvl	fil	1	
									10	gvl	lbk	0	
									20	cbl		0	
09-May-93	12	1137	1142	5	28	RL	DI	5	-4	rck	fuc	110	20 meters to MHHW
									1	rck	ala	40	
									15	rck	lbk	8	
									22	snd		0	
									28	snd		0	
09-May-93	13	1118	1121	3	21	RL	DI	5	-6	gvl	fuc	0	100 meters to MHHW
									-5	gvl	fuc	0	
									-4	gvl	fuc	0	
									-3	gvl	fuc	1	
									-3	gvl	fuc	3	
									-2	gvl	fil	0	
									-2	gvl	fil	0	
									-1	gvl	fil	0	
									0	gvl	fir	0	
									2	gvl	lbk	4	
									8	gvl	lbk	8	
									17	gvl	lbk	0	
									21	gvl		0	
09-May-93	14	1058	1103	5	10	RL	DI	5	-10	cbl	fuc	65	from MHHW
									-7	cbl	fuc	45	
									-3	rck	fuc	0	
									0	cbl	lbk	0	
									4	rck	lbk	0	
									6	rck	lbk	0	
									10	rck	lbk	0	rock cliff, no eggs

APPENDIX C

Aerial/skiff herring spawning ground surveys, 1993

1993 AERIAL/SKIFF HERRING SURVEYS

ANNETTE ISLAND, KAH SHAKES AND CAT ISLAND

3-10 10 sea lions off DeLong Islands.
4 sea lions above Cascade Inlet.

3-17 Small herring school N of Crab Bay.
35 sea lions NE side Hog Rocks.
23 sea lions off Quadra Point.

3-24 8 sea lions N of Crab Bay.
3 sea lions W of Quadra Point.
2 sea lions off Quadra.
20 off Kah Shakes Point.
4 sea lions near House Rocks.

3-28 7 sea lions S of Harbor Point.
No sign of herring in or around Crab Bay. 44 nets were in the water just N of Crab Bay.
11 sea lions between Crab Bay and Kwain Bay.
9 sea lions N of Edge Point, herring observed on SW side of Mary Island.
8 sea lions and birds were also in that area.
ACTIVE SPAWN SW of Mary Island.
ACTIVE SPAWN on S side of Double Island.
10 sea lions and small schools of herring.
5 sea lions off Quadra Point.
2 off Bull Head Cove.

3-29 8 sea lions N end of Ham Island.
12 sea lions N of Crab Bay near where the nets were located.
No active spawn observed.
6 sea lions S of Bostwick Reef.
7 N of Village Island.
No activity observed on the Kah Shakes side.

3-30 **ACTIVE SPAWN** located on the SW side of Mary Island.

3-31 55 sea lions N of Crab Bay.
School of herring in lower end of Crab Bay.
ACTIVE SPAWN/schools of herring in Kwain Bay.
11 sea lions S of Kwain Bay along the shoreline.
Herring S of Annette Point.
12 sea lions S of Double Island.
12 E side of Cat Island.
15 sea lions near NW corner of Customhouse Cove.
28 more SW side of Mary Island.
Schools of herring along the W shore of Mary Island.
20 sea lions and a school of herring were seen along with **ACTIVE SPAWN** on the S side of Mary Island.
Kah Shakes side, 15 sea lions N of Slate Island.
3 sea lions off Kah Shakes Point.
1 sea lion N of House Rocks.
1 sea lion S of DeLong Islands.

4-1 34 sea lions in Crab Bay and to N of Kwain Bay. Unable to survey Kah Shakes side due to poor visibility.

4-2 55 sea lions outside Crab Bay.
45 more inside Kwain Bay.
SPOT SPAWN in upper Kwain Bay. 15 sea lions S of Kwain Bay.
35 sea lions near NE corner of Cat Island.
15 along E side.
5 sea lions noted S of Pt. Winslow.
20 near Danger Island.
5 more on the SE corner.
3 out from Beaver Creek.
10 more N of Beaver Creek.
10 just S of Grant Point.
Nothing observed to Black Island.
1 sea lion outside of Kah Shakes Cove.
1 S of House Rocks.

4-2 **SPOT SPAWN** located in northern area of Kwain Bay.
35 sea lions.
20 sea lions between Kwain and Crab Bays.
10 sea lions in the southern section of Mary Island
43 on the E side of Mary Island

4-3 No spawn observed near Annette Island;
15 sea lions located in Kwain Bay
13 scattered S of Kwain Bay.
10 sea lions off Danger Island and a school of herring just N of Lane Island.
25 sea lions were observed off Edge Point.

4-4 10 sea lions S of Crab Bay;
11 in Kwain Bay.
6 sea lions located NW of Bostwick Reef.
2 sea lions outside of Mary Island Anchorage,
3 S of Edge Point,
25 off N end of Cat Island
5 S of Fripo Island.

4-5 No activity on the Kah Shakes side.
30 sea lions S of Village Island,
Herring observed near NE corner of Dog Island.
15 sea lions NW corner of Cat Island.
5 sea lions along W coast of Mary Island.
N side of Lane Island, 10 sea lions.
4 more off Danger Island.
20 sea lions in Kwain Bay.

4-6 No activity on Kah Shakes side.
4 sea lions N of Crab Bay.
5 N of Indian Rock.
2 S of Indian Rock.
25 sea lions NW corner of Dog Island.
School of herring SW side of Mary Island.
30 sea lions to the W of herring.
8 sea lions below Danger Island.
15 near N part of Cat Island.
6 seen NW of Whale Rocks.

4-7 13 sea lions S of Kwain Bay.
3 sea lions S Dog Bay.
4 W of Grave Point.
31 sea lions scattered along W side of Cat Island.
45 sea lions S Fripo Island.
Old **SPOT SPAWN** E side of Mary Island.

4-9 20 sea lions in Kwain Bay.
9 along coast S of Kwain Bay.
A good school of herring observed inside of Dog Bay.
SPOT SPAWNS located along the NW side of the island and towards NE side
70 sea lions along same side.
School of herring sighted on N side of Dog Island.
5 sea lions on the W side of Double Island.
30 sea lions W side of Cat Island.
10 sea lions N of Slate Islands.
1 E of Slate Island.
No other activity observed on the Kah Shakes side.
50 sea lions W side of Dog Island.
25 on N side.
Herring along NW corner and N side of Dog Island.
10 sea lions N of Fripo Island.

4-10 Birds/28 sea lions between Kwain Bay and Crab Bay.
6 sea lions S of Indian Rocks.
18 sea lions SW side of Dog Bay.
ACTIVE SPAWN along NW side and N part of Dog Island.
ACTIVE SPAWN NE side of Double Island.
100 plus sea lions vicinity of Double Island.
Birds/8 sea lions NW side of Cat Island.

ACTIVE SPAWN from NW to NE sides of Dog Island.
ACTIVE SPAWN N area of Double Island/S of Village Island.
ACTIVE SPAWN 5 sea lions S of Cat Island/NW side.

ACTIVE SPAWN located from NW to N side of Dog Island.
Herring and **ACTIVE SPAWN** around Double Island.
30 sea lions around SW side of Cat Island.
Herring/**ACTIVE SPAWN** NW side of Cat Island.

4-11 31 sea lions in Dog Bay.
Small area of spawn W side of Dog Bay.
ACTIVE SPAWN on N side of Dog Island.
Sea lions around Fish Island.
ACTIVE SPAWN located N part of Cat Island.
2 sea lions N of Danger Island.

4-12 School of herring located on S end of Dog Bay.
ACTIVE SPAWN on the W side around to E side of Dog Island.
65 sea lions W side of Dog Island.
ACTIVE SPAWN observed in Pond Bay.
Double Island surrounded with **ACTIVE SPAWN.**
Village Island nearly encircled with **ACTIVE SPAWN.**
Majority of Cat Island surrounded by **ACTIVE SPAWN.**
Small area of **ACTIVE SPAWN** on Fripo Island and Lane Island.
Small area of **ACTIVE SPAWN** N of Crab Bay; 7 sea lions in the area.

4-13 No activity seen on the Kah Shakes side.
6 sea lions N of Crab Bay.
Spawn throughout Dog Bay and along N side of Dog Island.
Spawn on the eastern side and Pond Bay.
Spawn on W side of Double Island.
Village Island completely encircled with **ACTIVE SPAWN.**
Spawn along W, S and E sides of Cat Island.
Spawn at northernmost area of Cat Island.
Spawn on W side of Fripo Island.
60 sea lions in Dog Bay.
100+ NW of Village Island.
30 W of Cat Island.

4-14 Birds E of DeLong Island and off Bullhead Cove.

Many birds near Snail Rock.
No active feeding/no herring or spawn observed.
Birds S side of Mary Island.
13 sea lions off NE side of Cat Island.
30 seals, birds, in the bay of Cat Island.
Old spawn E side of Cat Island.
Birds S end and around Village Island.
Birds around Dog Island; no active spawn observed.

4-15 Birds E side Slate Island.
NE of DeLong Islands.
Few birds N of Crab Bay.
Birds in Dog Bay, NE corner of Dog Island, off Double Island and Grave Point.
20 seals SW of Grave Point.
Birds around Cat Island.
20 sea lions N side of Cat Island.
Many scoters S side of Mary Island.
Birds S end of Ray Anchorage.

4-18 **ACTIVE SPAWN** from Cedar Point along shoreline of Smugglers Cove.

4-20 No active spawn anywhere nor any mammals.

4-23 Small **spawn** inside Metlakatla Harbor, no fish observed.

4-26 Few birds E and N side of Cat Island and S of Edge Pt.
Scoters around Village Island.
Birds S end of Double Island and inside Dog Bay.

Total spawn Cat Island = 14.0 nautical miles

WEST BEHM CANAL

4-13 **ACTIVE SPAWN** off Pt. Higgins; inside areas of Tatoosh Islands.

ACTIVE SPAWN N of Point Higgins and along Survey Point.
Herring near S side of Stack Island.
ACTIVE SPAWN throughout Tatoosh Island.
About 39 sea lions around Tatoosh Rocks.
Sample taken from the lowest of the Tatoosh Islands on the N side.

4-14 2 sea lions off Caamano Point.
6 in the area of Bond Bay.
Few birds off Smugglers Cove.
No activity in Helm Bay area.
Herring in Raymond Cove.
ACTIVE SPAWN along outside shoreline above Raymond Cove.
Further up the shoreline **LIGHT ACTIVE SPAWN.**
Some old spawn was noted just above that.

4-15 Birds in Bond Bay; **ACTIVE SPAWN** along shoreline S of Smugglers Cove.
Birds on both sides of entrance to Smugglers Cove.
Old spawn observed along lower shoreline of Wadding Cove and below Raymond Cove.
ACTIVE SPAWN on right hand side to entrance of Raymond Cove. Birds were in that area also. Old spawn recorded S of Point Frances.
2 sea lions off Point Higgins; old spawn noted N of there.
Sample taken from Clover Pass; **ACTIVE SPAWN** observed.
Herring seen N of Clover Island.
Birds noted on N side of Black Island; **SPAWN** located on N side of Tatoosh Islands; some old spawn on S side of the middle island.
Birds S end of Pennock Island.

4-16 **ACTIVE SPAWN** on shoreline N of Bittersweet Rock.
Birds in Bond Bay area.
6 sea lions outside Smugglers Cove.

4-17 5 sea lions S of Smugglers Cove; birds below that area.
25 sea lions N of Bittersweet Rock.
20 just S of Bond Bay.

4-18 10 sea lions in Bond Bay.
ACTIVE SPAWN throughout the shoreline of Bond Bay and to the S.
ACTIVE SPAWN noted along shoreline N of Bittersweet Rock and S of Smugglers Cove.
ACTIVE SPAWN on shoreline E side of Raymond Cove and up the shoreline below Point Frances. Birds outside of Smugglers Cove.

4-20 **ACTIVE SPAWN** located on shoreline adjacent to Pond Reef along Point Higgins up to Knudsen Cove.
Additional **ACTIVE SPAWN** throughout Tatoosh Island and on the NW side of Betton Is.
ACTIVE SPAWN along the N edge of Betton Is. and down the E side.
ACTIVE SPAWN surrounded Black Island, possible drift.
ACTIVE SPAWN S of Moser Island.

4-23 No spawn or herring observed.

4-24 Birds along shoreline by Point Higgins; outside of Joe Island.
Birds along N and W shoreline of Betton Is.
Birds in Bond Bay, 6 sea lions across from Bittersweet Rocks and up shoreline to Smugglers Cove. Scoters near Raymond Cove.

Total spawn observed = 13.6 nautical miles

KASAAN

4-8 No spawn. Few birds Kasaan Bay.

4-13 Herring N of Kasaan.

4-16 Old spawn lower side of Mills Bay.
ACTIVE SPAWN from S side of Sandy Pt. to just below the Indian Cabins area.

4-17 **ACTIVE SPAWN** Sandy Pt.

4-18 **ACTIVE SPAWN** just N Kasaan.

4-19 No active spawn.

Total spawn observed = 3.9 nautical miles

CRAIG

3-7 Bird activity N and W side of Fish Egg Island.
Gulls/eagles feeding on herring on the NW side of Abbess Island.
18 sea lions along the Klawock Reef.
5 sea lions off Pt. Ildefonso.
Whale on S shoreline of St. Philip Island; 4 sea lions and 2 more sea lions off Blanquizal Point.

3-10 No herring activity.
18 pounds located near Entrance Pt.

173 pounds W side of Wadleigh Is. near the Alberto Islands.

3-16 Birds/eagles W side of Fish Egg Is. 200+ birds NW of Abbess Island.

3-17 30 scoters near W side of Port Bagial, large number of birds on S and W side of Fish Egg Island. 50 gulls "sleeping" near Clam Is.
Bird and sea lion activity NE side of San Fernando Is.
Scattered flocks of birds and several porpoises N of San Juan Bautista Is.

3-18 Sea lions/birds scattered around W and N sides of Fish Egg Is. and N of Abbess Is.
large number of birds SW of Rosary Island.
76 cormorants near San Clements Is.
Large school of herring S of Pt. Amargura with birds feeding on them.

3-23 Birds/sea lions near Fish Egg Is. and Klawock Reef.
The F/V BILLY & I reported a school of herring in 8 fathoms of water.

3-24 10 pods of sea lions on Alberto Reef; about 110 sea lions off Alberto Reef.
85 sea lions around Alberto Is.
Small ball of herring/birds feeding/30 sea lions in the Klawock Reef
About 46 sea lions at N end of Fish Egg Island.
Birds N of The Witnesses.
200+ eagles near Hermanos Island; more eagles and birds N of the island.

Six sea lions were on W side of San Juan Bautista Island.

3-25 Eagles S end of Port Bagial. The survey included the areas from Abbess Island south to Fish Egg Island.
Numerous birds/eagles in the area with herring spotted S of Entrance Pt.

Birds N of San Fernando Island.
Birds feeding on herring near Klawock Reef.

3-26 Birds/sea lions feeding on herring south of Ballena Island.
Herring sighted S of Port Bagial.
Birds Pt. Miraballes.
ACTIVE SPAWN/birds/sea lions on NW side of Fish Egg Is.
Eagles working on herring in Klawock Reef area.

3-27 Boats reporting in, indicated a large school of herring had come into the pound area but left early in the morning. Fish jigged were ripe. 6 sea lions off the west side of the Coronados Island. **ACTIVE SPAWN**/birds/eagles NW side of Fish Egg Is., Gulls/eagles feeding on herring N of The Witnesses.

3-28 Herring E of Wadleigh Rocks.
Bird off Clam Island possibly working on old spawn.
Birds/35 sea lions off the W side of Abbess Island.
ACTIVE SPAWN observed in the Klawock Reef area.
7 sea lions just S of the reef.
50 sea lions to N and S of Cole Island.
ACTIVE SPAWN along NW side of Fish Egg Is.
200 sea lions on W side of the island.
ACTIVE SPAWN on S tip of Fish Egg Is.; 25 sea lions to W.
30 sea lions observed off W side of Ballena Is.
15 on W side of Port Bagial.

3-30 15 sea lions near N side of Ballena Island.
Birds sighted off Coronados Is.
Two small balls of herring N of Alberto Island.

Birds located throughout Klawock Reef area and off the W and S of Fish Egg Is. 80 sea lions in Klawock Reef area and N end of Fish Egg Is.
ACTIVE SPAWN documented along N and W side of Fish Egg Is.
30 sea lions/birds off S end of the island.
10 sea lions and small amount of birds located S of Sombrero Is., 1 N of Blanquizal Pt.; 1 on the N tip of St. Philip Island.

3-31 **ACTIVE SPAWN** along W and S shoreline of Fish Egg Is. and on N side of Cole Is. **ACTIVE SPAWN**/200+ sea lions on SW side of Fish Egg Is. 120 sea lions near the S end of Fish Egg Is. 200+ sea lions N end of Fish Egg Is. and near Cole Is. 30 sea lions around Klawock Reef area; 15 S of Clam Island.
Small **ACTIVE SPAWN** starting SW of Fish Egg Is.

4-1 **ACTIVE SPAWN** around inner shorelines of Crab Bay in Craig.
ACTIVE SPAWN W and N sides of Fish Egg Is.
ACTIVE SPAWN almost all around Cole Island.

4-2 **ACTIVE SPAWN** located on SE and W sides of Port Bagial. Birds/sea lions active. 2 humpback whales W of the area and in the San Juan Bautista Island area.
Numerous sea lions scattered throughout area of Entrance Pt.
ACTIVE SPAWN on N side of Clam Island.
40 eagles sighted NW of The Witnesses.
25 eagles on S end of Point Ildefonso.

4-3 2 sea lions/few gulls S of Shelter Cove.
6 sea lions W of Port Bagial, 10 sea lions south of Port Bagial.
Birds W of Coronados Island.
Numerous birds/sea lions throughout area S of Abbess Island to Fish Egg Is.
One humpback whale W of Fish Egg Is.
Birds/gulls/eagles feeding W of The Witnesses.

4-4 Large flock of gulls off Unlucky Pt.
Gulls south of Canoe Pt.
100 sea lions observed from Ballena Is. to Port Bagial.
Birds between Port Bagial and Coronados Islands.
Birds encircling Fish Egg Is.; 25 sea lions on the southern end.
15 sea lions around Klawock Reef.
15 sea lions/birds in area of Alberto Reef.
30 eagles located off S end of Abbess Is.
4 sea lions/bird activity were seen off The Witnesses.
Birds circling S of Blanquizal Pt.
4 sea lions located off S end of St. Philip Island.
3 humpback whales sighted off N end of San Juan Bautista Island.

4-6 2 killer whales W of Port Bagial.
Birds/1 sea lion E side of Port Bagial.
Birds in area Ballena Is.
6 sea lions NE of the island.
Survey continued from Abbess Island S to Fish Egg Island.
Birds on SW and N side of Fish Egg Is. 1 humpback whale W of Alberto Is.
6 sea lions SW of Abbess Island.
8 killer whalers/surface herring birds off NE side of San Juan Bautista Is.

4-7 Small schools of herring from Wadleigh Is. S to Fish Egg Is.
Bird/eagles located near Klawock Reef.
Herring between 10 and 80 fathoms of water throughout the survey area.
3 small schools N of The Witnesses.
12+ small schools in 5 to 20 fathoms from Point Ildefonso S to Point Polocano. 4 eagles were sighted off Pt. Polocano.

4-8 No spawn. Few birds in Craig area.
No spawn. Few birds Craig to El Capitan.

4-9 PREVIOUS SPAWN E and S sides of Cole Island and on NE shore of Fish Egg Is.
6 seals in Klawock Reef area. Gulls/eagles off Blanquizal Is.

4-10 Recorded several small schools from 50 to 60 fathoms from San Juanito Island to Madre de Dios Island.
N end of San Juan Bautista Island schools ranged from 10 to 60 fathoms.
S end small schools located near surface.
2 sea lions.
Around Port Bagial and Pt. Miraballes, numbers of schools from 10 to 50 fathoms.
Good bird activity SW of Fish Egg Is. Fish 5 fathoms deep.
More schools NW side of island in 10 to 15 fathoms of water with a small ball of herring on the surface to 8 fathoms N of Cole Island.
Pacific porpoises seen in area.
Small schools of herring from surface to 10 fathoms located on N end of San Juan Bautista Is.

4-13 10 sea lions S of Port Bagial.
8 sea lions located S of Abbess Island.
15 below Alberto Island.
8 N of Wadleigh Rocks.
15 sea lions W of Clam Island.

4-16 Birds working herring off shoreline S of Pt. Polocano.
Small area of **ACTIVE SPAWN** S of Fern Pt.
ACTIVE SPAWN on the shoreline W of Pt. Ildefonso.

4-17 **ACTIVE SPAWN** N shore of Abbess Island.
8 sea lions off Cape Cambon.
3 sea lions located S of Pt. Eugenia on San Juan Bautista Is.

4-18 **ACTIVE SPAWN** includes W and E side of Abbess Island, along the W shoreline of Wadleigh Island, S side of Clam Island, shoreline of San Fernando Island near Point Santa Lucia, shoreline opposite Point Ildefonso.

4-19 **ACTIVE SPAWN** SW areas of Wadleigh Island and on NW shoreline.
7 humpback whales off Pt. Eugenia on San Juan Bautista Island.
ACTIVE SPAWN NW of Pt. Ildefonso.

4-21 3 balls of herring/bird activity NW of Green Island.
8 sea lions below Limestone Pt.
Birds/3 sea lions S of Can Dant Cove.
LIGHT SPAWN noted in the cove.
LIGHT SPAWN along the N shoreline of Heceta Island.
3 sea lions in the same area.
14 sea lions off Alberto Island on the W side.
2 on N side.
Birds in the area of Clam Is.
3 sea lions off Palisade Pt.
8 seen off Pt. Eugenia on San Juan Bautista Is.
3 sea lions observed off Fern Point.

Total spawn observed = 8.4 nautical miles

HYDABURG

4-18 **ACTIVE SPAWN** observed on 2 of the islands NE of Jackson Island.

4-26 Birds NE of Jackson Island. Two small areas in these islands had **ACTIVE SPAWN.**

Total spawn observed = 1.9 nautical miles

HOBART BAY

4-15 4 balls, 44 sea lions, 2 whales.

4-20 No spawn, fish leading beach, several large schools, 22 sea lions.

4-21 **ACTIVE SPAWN** - 0.2 N. miles N. of CAA station, spot N. of Pt. Hobart, 50 sea lions.

4-22 **ACTIVE SPAWN** - 1.8 N. miles, schools by lagoon, 61 sea lions.

4-23 **ACTIVE SPAWN** - 3.3 N.miles.

4-24 **ACTIVE SPAWN** - 1.6 N.miles.

4-25 **ACTIVE SPAWN** - 0.2 N.miles, 0.6 N. miles of eggs N of CAA skiff survey (2.1 to date S. shore, 2.6 N. shore).

4-25 **Spot spawn** on S shore, 13 sea lions.

4-26 No fish or spawn, 13 sea lions.

4-27 No fish or spawn, 19 sea lions, 2,000 birds.

4-30 No fish or spawn, 10,000 birds.

Total spawn observed = 5.1 N. miles

PORT HOUGHTON

4-15 2 large schools N. shore.

4-20 **ACTIVE SPAWN** - 0.35 N. miles.

4-21 **ACTIVE SPAWN** - 3.0 N. miles, schools leading, 40 sea lions.

4-22 **ACTIVE SPAWN** - 3.1 N. miles, 99 sea lions.

4-23 **ACTIVE SPAWN** - 2.3 N. miles.

4-24 **ACTIVE SPAWN** - .5 N. miles.

4-25 **ACTIVE SPAWN** - 1.2 N. miles.

4-26 **SPOT SPAWN** E. of bluffs.

4-27 No fish no spawn, 4,000 gulls 5,500 scoters.

4-30 No fish no spawn, 20,000 gulls, 10,000 scoters.

Total spawn observed = 6.1 nautical miles
Total Port Houghton/Hobart Bay/CAA site spawn observed = 12.3 nautical miles

FARRAGUT BAY

4-15 No fish leading beach, 35 small balls E. of Read Is, 64 sea lions.

4-20 No fish leading beach, 12 balls in S. arm, 38 sea lions.

4-21 No fish leading beach, 43 sea lions.

4-22 No fish leading beach, 23 sea lions.

4-23 Fish leading beach (Reimer).

4-24 **ACTIVE SPAWN**--0.5 N. miles N. arm.

4-25 **ACTIVE SPAWN**--1.6 N. miles (entire N. arm white w/milt).

4-26 Spot of milt @ Bay Pt.--possible old spawn.

4-27 **ACTIVE SPAWN**--0.6 N. miles @ Bay Pt.

4-28 **ACTIVE SPAWN**--0.3 N. miles N. side of N. arm.

5-04 No Spawn Activity, lots of birds in N. arm.

5-11 No Spawn Activity, lots of birds in N. arm.

Total spawn observed = 2.7 nautical miles.

PORT CAMDEN

4-23 4 **SPOT SPAWNS** - 3 on W. side, 1 on E. side.

4-24 **ACTIVE SPAWN**--0.9 miles (most on W side, spot on E).

4-25 **ACTIVE SPAWN**--1.9 N. miles (1.2 on E. side).

4-26 **ACTIVE SPAWN**--0.3 N. miles.

4-27 No fish or spawn.

4-28 2 schools 1/2 mi S. Cam Is.

4-30 No fish or spawn, very windy.

5-17 No spawn. Several balls along E. shore below Cam Is.

Total spawn observed = 3.0 nautical miles (all N. of Cam Is.)

THREE MILE ARM

4-23 Balls & stringer on flats at head, no spawn.

4-24 Few balls; no spawn.

4-25 Schools in same area as earlier plus school further out.

4-26 Schools in same area, no spawn.

4-27 Schools in same area, no spawn.

4-28 No activity.

4-30 No activity.

5-11 No activity.

5-17 **ACTIVE SPAWN**--0.25 N Mi. and one spot near mouth of 105-31-010.

5-19 One school on S. shore.

Total spawn observed = 0.25 nautical miles

ERNEST SOUND

4-19 No activity.

4-20 2 schools in Vixen, no activity elsewhere.

4-23 **ACTIVE SPAWN**--3.3 N. miles in Vixen, no activity elsewhere.

4-23 **LIGHT SPAWN** S end of Vixen Cove.
ACTIVE SPAWN all along shoreline up to entrance to Vixen Inlet.
6 schools of herring in Vixen Inlet.
ACTIVE SPAWN estimated to be about 2.75 miles.
100 to 150 birds in area.
No sign of herring in Union Bay or Meyers Chuck.

4-24 7 sea lions off N tip of Vixen Point.
ACTIVE SPAWN all around Vixen Pt. S along shoreline.
Samples taken along this area. Not many were taken.
2 eagles; 25 sea lions in this area.
75 sea lions; 100 scoters along N side of Vixen Inlet.
LIGHT SPAWN on upper shoreline; additional **ACTIVE SPAWN** further up shoreline. More **ACTIVE SPAWN**, 100+ lower shoreline of Vixen Inlet
More **ACTIVE SPAWN,** samples taken, toward Vixen Harbor.
No activity in Union Bay.

4-24 **ACTIVE SPAWN**--4.3 miles on S. shore.

4-25 No spawn activity, 30 sea lions, 500 scotters, 200 gulls in Vixen.

4-26 No activity.

4-27 Skiff survey 1.7 miles of eggs on S. shore.

Total spawn observed = 9.0 nautical miles

ZIMOVIA STRAIT

4-25 1 school at Pats Cr.

5-04 1.3 N. total miles **ACTIVE SPAWN** on 5/4 and 5/5 @ Pats Cr.

5-07 Foot survey eggs light mostly on eel grass.

Total spawn observed = 1.3 nautical miles

PYBUS BAY

4-23 No activity.

4-25 No activity.

4-26 No activity.

4-30 No activity.

GAMBIER BAY

4-23 No activity.

4-25 No activity.

4-26 No activity.

4-30 No activity.

ALVIN BAY

5-11 No activity.

5-12 **Spot Spawn** at mouth of 105-31-020.

5-17 No activity.

TEBENKOF BAY

5-11 No activity.

5-12 No activity.

BAY OF PILLARS

5-12 Strip of eggs found on north side of inner lagoon in small uncatalogued stream E. of 105-52-020. Strip was 10' wide 50 yds. long. 40,000-300,000 hits on fir.

NO NAME BAY

5-11 No activity.

5-17 **SPOT SPAWN** on and one ball on S. shore.

ROWAN BAY

5-12 No activity.

REID BAY

5-11 No activity.

5-17 Small **SPOT SPAWN** on S shore and Lots of birds at mouth of 105-31-29.

PORT BEAUCLERC

5-11 No activity.

5-17 No activity.

AFFLECK CANAL

5-11 0.125 N. miles of eggs at head of Canal, No spawning activity.

5-17 No activity.

KEKU STRAIT/ROCKY PASS

5-11 No activity.

5-17 No activity.

NECKER BAY

4-11 No activity.

4-19 Looks quiet. No herring or spawn observed.

4-23 No herring or spawn observed.

SITKA AREA

3-19 First herring survey. Some sea lions and bird activity in Eastern Channel and Lisianski Point.

3-23 Large concentration of sea lions from Deep Inlet to Cape Burunof and inside Samsing Cove. Large concentration of gulls in the area. Possibly some spot spawn has occurred in the area.

3-24 First **spot spawn** observed at Silver Point. Numerous gulls and sea lions in Aleutkina to Burunof area. Large concentration of birds in Eastern Channel and off S end of runway. N end of town looks very quiet.

3-25 Several whales, sea lions and birds in Eastern Channel. Fish boiling on surface in Silver Bay. Numerous birds in Aleutkina/Samsing area. Fewer sea lions than yesterday, appear to have moved into Eastern Channel.

Nothing at Goddard or N of town.

The R/V Polaris searched area between Nakwasina Sound and Cape Burunof. No fish were seen N however, many small schools and a band of fish was seen moving N under the bridge. Large concentration of fish was observed in Eastern Channel and entrance to Silver Bay.

3-26 Aerial Survey 7:30 a.m. Numerous birds, whales and sea lions in Eastern Channel. **ACTIVE SPAWNING** at Silver Pt. Big change at the N end. Fish leading heavily along the beach from Thompson Harbor to Starrigavan, around Kasiana Is. and E side of Middle Is. Intense **spawning** at Halibut Point and just starting at Kasiana Is.

3-27 Polaris survey 5:00 a.m. Intense major **ACTIVE SPAWN** from Channel to Halibut Pt. Schools become more dense from Halibut Pt. to Harbor Pt.

Intense **ACTIVE SPAWNING** along the road system from "Turn Around" to "Cove", Kasiana Is. and Indian River Flats. Total spawn to date: 6 miles N and 1.5 miles S.

Salisbury very quiet.
Middle Is. - several large schools and stringers on SE side.
Kasiana Is. - intense spawning almost completely around island.

Heavy **spawning** along Halibut Point Road from Starrigavan to Thompson Harbor.

3-28 Katlian - 5 large schools in outer bay
Dog Point - 2 schools
Entrance to Olga - several large schools and stringers of herring
Salisbury - very quiet
Middle Is. - SE end **spawn** and some schools
Kasiana - heavy **spawn** almost completely around island
Halibut Point Road - **spawn** from Starrigavan to Thompson
Good **spawning** in Whiting Harbor and Causeway
Herring **spawning** along Indian River Flats; spot spawn in Jamestown Bay
Numerous sea lions in Aleutkina/Samsing and whales lunge feeding in Eastern Channel
No herring seen S of Cape Burunof to Goddard
Fishery going slower today and mostly occurring on the SE end of Middle Is., N side of Kasiana Is. and Harbor Pt. to Katlian Bay
Approximately 20 miles of spawn to date.

3-29 N end - intense **spawning** along Halibut Point Road from Starrigavan to Thompson Harbor around Kasiana Is., Whiting Harbor and beginning along SE end of Middle Is.
S end - **spawning** good along Indian River Flats, spots in Jamestown Bay and Galaklin Is. No fish seen in Aleutkina/Samsing area.

3-30 Included Polaris survey. Good **spawning** occurring along Halibut Point Road from Channel to Mosquito Cove, Kasiana Is., SE end of Middle Is. and the islands south of bridge. No fish observed in Goddard and no spawning in Aleutkina/Samsing area.

Total spawn 26 miles.

3-31 Intense major **spawning** Halibut Point Road from channel to Mosquito Cove, Kasiana Is., SE Middle Is., south of the bridge. First major **spawn** in Aleutkina/Samsing area.

40 miles of spawn recorded to date.

4-1 **Spawning** subsiding along Halibut Point Road between Thompson Harbor and Halibut Pt. but going strong yet between Halibut Pt. to Mosquito Cove. **Spawn** just starting on Little Gavanski Is. Intense **spawn** almost completely around Middle Is. **Spawn** subsiding and light around Kasiana Is. Major spawning between Silver Pt. and Sandy Cove. No herring or indications of herring S of Cape Burunof to Goddard. Spawn has almost completely dissipated S of bridge in the islands and Indian River.

Polaris survey. No herring in Goddard or Windy Pass. Fairly good concentrations of fish (15-20 large schools) outside Frosty Reef near Kanga Bay.

4-2 Good **spawning** from Silver Pt. to Samsing Cove, Mosquito Cove, Lisianski Pt. and Middle Is.

4-3 Spawning subsided considerably. **Spawning** active in Samsing, Pirates Cove, Middle Is.

4-4 S end - couple **spot spawns** in Aleutkina area. Appears to be done. Nothing yet in Redoubt/Goddard area. N end - only a few **small spots** on W side Middle Is.

4-5 No spawn observed today.

4-6 Small school in Kanga Bay and Salisbury Sound. Buildup of sea lions in Windy Pass. No spawn anywhere today.

4-8 .5 mile of **spawn** inside Taigud Is.

4-9 Spawn gone in Taigud Is. Large number of sea lions in Kanga Bay and entrance to Redoubt Bay.
Increased bird activity in Windy Pass. No fish seen in Goddard.

4-11 Sitka Sound - Approximately 2 miles of **ACTIVE SPAWN** in Kanga Bay. Goddard looks quiet except for good numbers of sea lions in Windy Passage.

4-12 Small **spot spawn** in Kanga Bay.

4-14 Sitka Sound - flew Goddard and Redoubt area. Nothing seen.

4-17 Numerous gulls and sea lions in Windy Pass. No fish or spawn observed.

4-19 Sitka area - Approximately .5 miles of **ACTIVE SPAWN** in Windy Passage. Numerous sea lions and birds in this area. Nothing in Goddard. Approximately 2 miles of intense **ACTIVE SPAWN** from Silver Pt. to Camp Coogan and Galankin island. Nothing in Salisbury Sound.

4-20 Goddard - intense **ACTIVE SPAWN** for 2 miles on Gornoi and Golf Is.

4-21 Goddard - spawn completely dissipated in Windy Pass. No evidence of new fish in the area.

Total spawn observed = 55.3 nautical miles

HOONAH SOUND

4-2 Skiff survey; no herring or spawn observed.

4-11 Looks very quiet. No birds or sea lions.

4-14 Numerous sea lions have moved into the fishing area between Fick Cove and Vixen Island. One whale also observed. No herring or spawn seen yet.

4-17 No spawn or herring observed. Numerous sea lions between Emmons Spit and Fick Cove.

4-19 Several whales and numerous sea lions in between Vixen and Moser Islands. No herring or spawn observed as yet.

4-21 Looks quiet, no change. No spawn or herring observed. Continued presence of whales and sea lions outside Fick Cove.

4-23 No change. Sea lions and whales continue to hang out W of Vixen Island.

4-25 No herring or spawn. Numerous sea lions and 6 whales on N side of Emmons and scattered groups from Fick Cove to Emmons Island.

4-26 Fishermen first capturing fish for pounds.

4-27 First **ACTIVE SPAWN** for approximately .5 mile east of Fick Cove. Fish leading between Emmons and Vixen Islands and east of Fick Cove. Fishermen capturing fish between Emmons and Vixen.

4-28 **Spot spawns** on W side of Emmons Island, SE corner of Moser Island and good spawn E of Fick Cove for 1 mile. Approximately half of the pounds have fish.

4-29 1 mile of **ACTIVE SPAWN** on S end of Emmons Island. Searched beaches at low tide. 4.25 miles to date.

4-30 No new spawn today.

5-1 Aerial Survey - No spawn or herring observed.

5-2 Skiff survey; no active spawn or herring observed.

5-3 Skiff survey; no active spawn or herring observed.

5-6 Approximately 1.5 miles of old spawn added from skiff survey during low tides for a total of 5.75 miles.

LISIANSKI INLET

4-23 No spawn or herring seen; numerous gulls and several sea lions scattered from Phonograph Creek to sunny side.

4-25 Nothing happening yet. Lots of gulls in area near town.

4-29 First **ACTIVE SPAWN** sighted near town. Only 2 spots.

4-30 Only 4 spots of **ACTIVE SPAWN** near Pelican.

5-1 Spawning has stopped possibly because of high winds last night.

5-3 Only .25 mile of **ACTIVE SPAWN** near town. Birds on beach near Stag Bay.

5-5 No spawn or herring observed. Appears to be done.

5-6 DeJong flew; no herring or active spawn observed. Flew complete shoreline of Lisianski Straits and Inlet and the shore on the outside of Yakobi Island, Column Pt. to Port Althorp and south of the Straits to Slocum Arm looking for old spawn. Old spawn was only found near Pelican and Stag Bay. A total of 1 mile was observed in the Straits and 1.2 miles at Pelican. It is baffling what happened to Lisianski spawn this spring. Only 2.2 miles was observed compared to 15 miles last year. Last year's spawn consisted predominantly of young 4-year old herring. It was expected that a good spawn would again occur in the Inlet.

Fishing this winter indicated large concentrations of fish were present in the Inlet. What happened to this year's spawners is a mystery. Either these fish moved to some other area to spawn or there was extremely high mortality.

5-9 Lisianski Inlet - R/V Sundance. Skiff survey of shores in morning at low tide revealed old light spawn of 1.3 miles near Pelican, 1.5 miles on Eastern shore north of the Strait, 1.4 miles between Mite Cove and Miner Island (very spotty), and about 1 mile of heavier spawn in the Strait near Stag Bay. Total spawn recorded was 5.2 miles for this area.

The Stag Bay and outer inlet spawn was strongly eyed and/or hatching with many dead fry in the water and loose eggs on the bottom. The spawn in these areas must have occurred in early April this season. Very few birds were seen along shorelines, making aerial observation of spawned areas unlikely.

LOWER LYNN CANAL/(JUNEAU)

4-19 No herring or spawn seen. Sea lions distributed as follows: 3 Cohen Is., 10 Scout Camp, 40 on rookery, 11 along rock wall below Bridget Point, and 3 at Bridget Point.

4-21 No spawn. Schools located W of Auke Creek (2), Boat Harbor (1), Wadleigh Creek (1), and Ferry Terminal (3). Sea lions located as follows: 5 on N end of Mab Island, 1 at Bridget Point, 1 along rock wall, 10 between Bridget Cove and Sunset Cove, and 100+ on rookery.

4-23 No spawn observed. Herring were located in schools in Indian Cove to ferry terminal (10), and E of the ferry terminal (10). Two whales between Lena Point and Aaron Island. Sea lions were on the rookery (100+) primarily and off Point Bridget (13).

4-25 Observed 4 whales outside Outer Point.

4-26 Brown algae bloom. Several whales around Aaron Island. Only found herring in Auke Bay (13 schools). Sea lions found between Bridget Point and Bridget Cove (35), mouth of Berners River (150), and many on rookery, although less than Friday.

4-27 Six herring schools in Auke Bay area. Four whales located off Lena Point out in middle of channel. More birds on beach at S end of Bridget Cove, outside Mab Island, along rock wall, and Point St. Mary. Sea lions on rookery (60), and along rock wall (4).

4-28 No spawn or herring. One whale located in Berner's Bay by Sawmill Creek, and another two whales located by Aaron Island. Sea lions located observed by mouth of Berner's River, Point Bridget (6), with over 100 on the rookery. Birds were gathered around wall between Bridget Point and Bridget Cove, but no spawn or eggs were observed.

4-29 Herring schools were observed in Auke Bay (10), Indian Cove (3), and Tee Harbor (2) schools. One whale spotted between Mab Island and Bridget Point. Scattered sea lions were observed from Eagle River to Echo Cove. Two schools located in NW cove of Mab Island, and 10 small schools from Echo Cove to Sawmill Creek. Sea lions observed between Echo and Sawmill, Bridget and Mab Island. Sea lions were sitting on Rookery.

4-30 Intermittent **ACTIVE SPAWN** from Sawmill Creek to Berner River Flats. Schools located in Tee Harbor (2), first cove north of Mab Island (1), Point Bridget (1) and Echo Cove (5). Rookery is half full.

5-1 **ACTIVE SPAWN** at N tip of Mab Island, and from the first cove north of Mab Island along the wall to the reef below Bridget Point. Spot spawn N of Sawmill Creek, and spawn starting at tip of Point Bridget and outside Mab Island. Lots of spawn already washed out. Herring schools located in Tee Harbor (1), by Ferry Terminal (3), Indian Cove (4) and many schools by Point Bridget.

5-2 Sporadic **ACTIVE SPAWNING** N of Sawmill Creek continues. Only one school of herring observed at breakline. Two dozen sea lions found along Sawmill Creek shoreline, not many birds. Rookery is half full.

5-3 Spots of **ACTIVE SPAWN** on Berners Bay reef, but very light. Six schools of herring located from Auke Bay to ferry terminal. Two whales observed at Point St. Mary and another two at Sawmill Creek. Sea lions seen only along Sawmill shoreline. Scoters on Berners Bay reef.

5-4 No spawn or herring. Very few sea lions observed in water; none were on the rookery.

5-6 No spawn or herring. Bird activity inside Bridget Point indicate an additional 25 yards of earlier spawn.

Total spawn = 3.2 nautical miles

TENAKEE INLET

4-21 Approximately 1 mile of light **ACTIVE SPAWN** on the S side of Seal Bay. Two miles of light spawn along Corner Bay Pt. Herring schools located N of Crab Bay (2), and S side of Crab Bay (2). Whale in Corner Bay. Sea lions S side of Crab Bay (10), Corner Bay (20), and 40 off Trap Bay. Nothing seen at East Point or Basket shore.

4-22 **ACTIVE SPAWN** continued outside Corner Bay Pt. toward Trap Bay. **ACTIVE SPAWN** began north entrance of Crab Bay and continued toward Saltery Bay for about 1 mile. Fish observed around Crab Bay shoreline and from Corner Bay to Corner Bay Point.

4-23 **ACTIVE SPAWN** continued W of Crab Bay toward Saltery for an additional 1+ miles. Birds on spawn on Corner Bay Pt. No schools were seen in Tenakee. Scattered sea lions located along Basket Bay shoreline.

4-26 Saw no fish or spawn. Birds on old spawn by Corner Bay Pt. One whale at South Passage Pt. Sea lions (14) were observed at East Pt., and Corner Bay Pt. (7).

5-6 Early Marine Studies reported spawn by Corner Bay log camp on May 4. Aerial survey verified spawn (or something that looked like milt) coming from the end of the log dump. Approximately 150 feet, but included some drift. Because of the place, suspect that this could also be some sort of pollutant.

5-7 R/V Sundance began Tenakee dive survey. Ran initial spawn mapping in a.m. with -4.2 tide, finding additional spawn on opposite shore of inlet from Seal Bay, and west tip of Saltery Bay entrance. Earlier spawn observed was increased in mileage, with more spawn toward Trap Bay.

Total spawn observed 6.4 nautical miles.

HOOD BAY

4-23 Nothing seen.

GAMBIER BAY

4-23 Nothing seen

SEYMOUR CANAL

4-23 Algae bloom. No herring or spawn observed. Sea lions located as follows: Point Hugh (20), Rock wall (7), Below Black Jack (10), Swimming Pool (12), and 30 off the Rock Garden.

4-25 No spawn; schools observed on west side of Point Hugh and by Swimming Pool.

4-26 Schools leading beach between Point Hugh and Blackjack. Whales and one school of herring at Sorethumb. Concentration of herring along shoreline between District boundary and Point Hugh. Whale at Twin Island. Sea lions at Twin Island (12), Black Jack (20), Black Jack to Point Hugh (27), and 10 at Point Hugh.

4-27 Fish on beach for a couple of miles both N and S of Black Jack. Over 100 sea lions in area. Another 4 sea lions by Point Hugh.

4-28 **First Spawn observed:** Heavy spawn located from Swimming Pool to Black Jack Cove. Schools of herring located in several areas: Two big schools N of Black Jack; another 3 schools between Slide and Sore Thumb. Twenty-five sea lions by the Rock Garden.

4-29 **ACTIVE SPAWN** observed from Swimming Pool to tip of Point Hugh. Herring schools seen from Faust Island to Swimming Pool. Whales and sea lions observed. **ACTIVE SPAWN** was continuous from Point Hugh to Black Jack Cove.

4-30 Spawning continues in restricted areas from Black Jack to Point Hugh. Observed approximately one mile of spawn above slide. Large herring school located off first point south of Sorefinger.

5-1 **ACTIVE SPAWN** observed from below District Boundary marker to cove above Point Hugh. Lots of schools located from Twin Islands to Swimming Pool. Surveyed from Cloverleaf Rocks to Dorn Island. **ACTIVE SPAWN** spotty north of Point Hugh along wall. Many herring schools observed on meter between Sore Thumb and Sorefinger.

5-2 **ACTIVE SPAWN** from Twin Islands to Swimming Pool, and a spot spawn first cove south of Sorefinger. Schools observed by Stone wall. Surveyed south from #9 Rock. **ACTIVE SPAWN** observed concurrent with air survey between Twin Islands and Swimming Pool.

5-3 New **ACTIVE SPAWN** in Rock Garden. Two schools near slide. Sea lions working on them on beach.

5-4 No additional spawn located. Only one herring schools seen by Rock Garden. No whales and very few sea lions remaining, mostly at the Rock Garden and Point Hugh.

5-5 No spawn, fish, and whales. Sea lions are scattered and few.

5-6 No spawn, herring, whales, sea lions or eagles. Lots of scoters. Only one small school by Black Jack Cove.

5-10 Pods of sea lions were observed by Rock Garden and large rafts of scoters were located by the Swimming Pool, and boundary marker. Initial skiff survey indicated additional spawn that had not been previously observed by either plane or skiff (4/29-5/2). Additional spawn was found between Rock Garden and Twin Islands.

5-11 Dive survey ended. No new spawning or herring observed. Deposition was heaviest below Black Jack. A total of 9.2 nautical miles of herring spawn was located in Seymour Canal.

5/18-19 Additional 1.75 nautical miles **ACTIVE SPAWN** near #9 Rock.

5-25 Responding to additional spawn observations from Vern Beir, Ingledue and Muir flew to Seymour to walk the beach from #9 rock to Dorn Island. An additional 1.75 nautical miles of spawn was observed with a -1.7 tide. Spawn was deposited in a relatively narrow band (10-50 meters) and was about 1-2 layers thick. Most of the spawn appeared to be above the low tide mark and dried out. No birds, or eagles were anywhere in sight.

Total spawn for Seymour Canal 10.95 nautical miles.

OLIVERS INLET

4-26 No birds, whales, sealions, herring or spawn observed

4-27 No birds, whales, sealions, herring or spawn observed

4-28 No birds, whales, sealions, herring or spawn observed

4-29 No birds, whales, sealions, herring or spawn observed

5-1 No birds, whales, sealions, herring or spawn observed.

5-2 No birds, whales, sealions, herring or spawn observed.

5-3 No birds, whales, sealions, herring or spawn observed.

5-4 **First spawn observed.** Spawn at head of inlet. Schools along the W shoreline in balls and stringers.

5-5 Major Spawn, over 1 mile. Most of S shore covered. Sample taken for Ted Meyers.

5-6 Light spawn at head of inlet. Eight schools of fish also observed.

Total 1.36 nautical miles of spawn for Olivers Inlet.

TAKU HARBOR

4-27 Low tide. Nothing seen.

5-3 Schools on beach near north shore. One sea lion and one whale by entrance to Limestone Inlet.

5-4: No spawn. Fish on beach with largest school by narrows inside Point Graves.

5-6 No spawn or herring observed.

GASTINEAU CHANNEL

4-28 One school observed with several flocks of scoters.

5-2 Searched Harbor with Monark; found 3 schools along north shore at 40 feet, 3 small schools outside bay, and one sea lion.

5-25 Several large schools of herring along Sandy Beach and Douglas Boat Harbor. Also reports of small herring in Auke Bay.

PORT FREDERICK

4-21 Nothing seen anywhere except one whale off Neka Bay.

5-6 No spawn. Sixty-two schools of herring, mostly balls and small stringers, scattered above the Narrows toward Eight Fathom Bight.

IDAHO/ALTHORP

5-6 No spawn or herring seen. Landed in Gull Cove to examine milky water, but kelp was clean and no birds were present. Red tide was noticed in Idaho Inlet and clam spawn was observed on both sides of inlet.

YAKUTAT

4-9 Aerial survey Chicago Harbor to Monti Bay. Approximately 100 yards of **spawning** activity at "Hatchet Pass " and approximately .5 ton school spotted at "Gonakadeseat Bay". No other signs seen. Russell Fiord was not surveyed. High overcast, visibility good.

4-22 Aerial survey Chicago Harbor to Monti Bay. No spawn seen. Two schools (approximately three tons total) were seen near "Broken Oar Cove". One school (approximately one ton) was seen at "Eleanor Cove".

4-21 Boat survey. Samples collected east of "Hatchet Pass". **Spawning** just starting to occur.

4-25 Boat survey Chicago Harbor to Monti Bay. Approximately 1000 yards by 10 yards of old spawn on eel grass between "Hatchet Pass" and "Broken Oar Cove". Approximately 300 yards by 6 yards of old spawn on eel grass at "Puget Cove". Approximately 20 yards by 3 yards of old spawn on eel grass at "Eleanor Cove" (very light deposit).

4-26 Aerial survey Russell Fiord to Monti Bay. Only one school of approximately two tons seen W of "Dolgoi Island" in Yakutat Bay. Eighteen schools seen in Russell Fiord ranging from one to ten tons. Some **spawning** activity in "Shelter Cove".

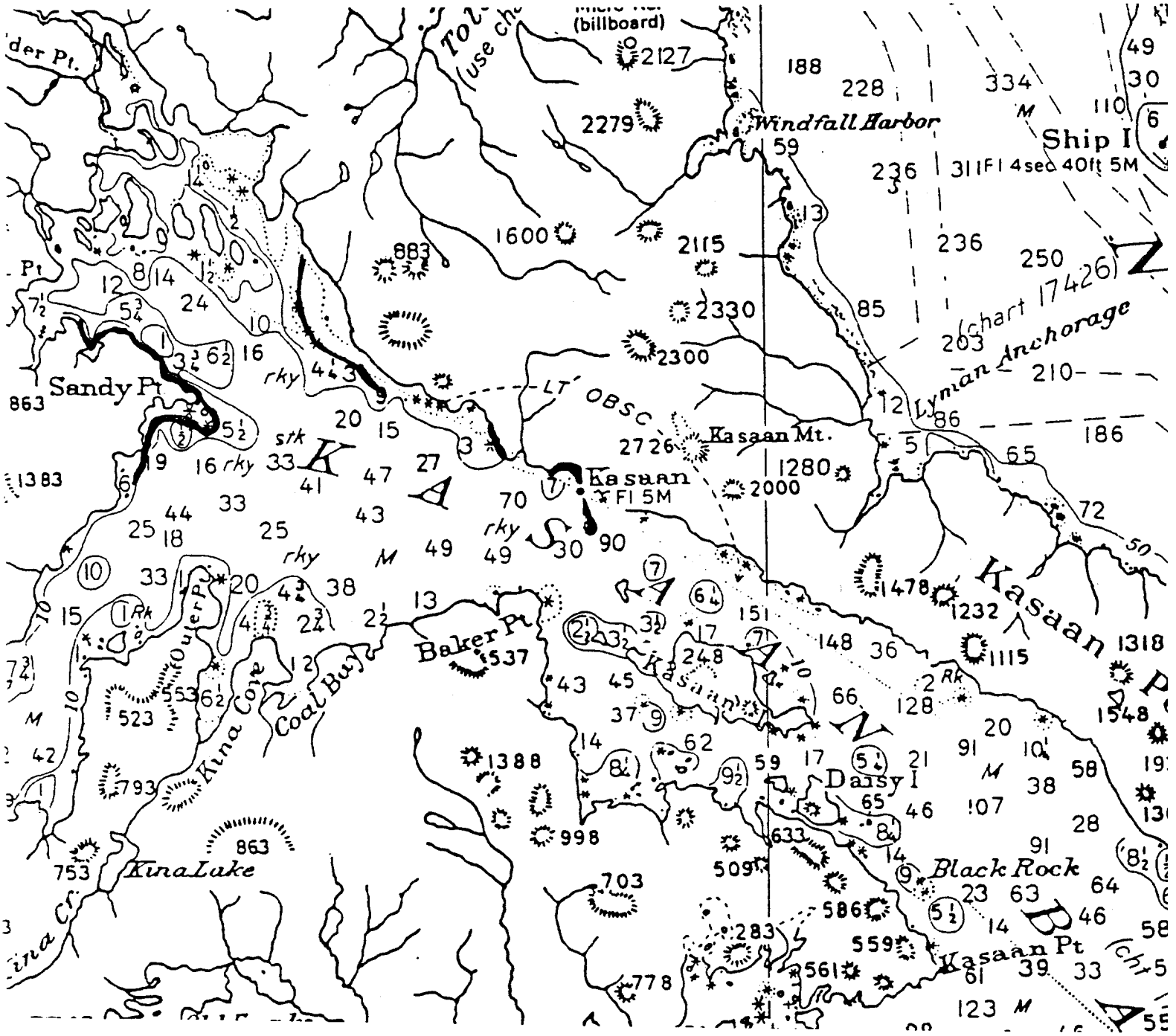
4-29 Aerial survey Russell Fiord to Monti Bay. No sign in Yakutat Bay although lots of birds in "Chicago Harbor". Eight schools and four areas of **spawn** in Russell Fiord. Total area of spawn was approximately 300 yards by 15 yards.

4-30 Boat survey. Approximately 125 yards by 10 yards of light (one layer on one side) old spawn on *fucus* in "Chicago Harbor". Approximately 250 yards by 10 yards of old spawn on eel grass in "Canoe Pass". Approximately 50 yards by 3 yards of old spawn on eel grass just north of "Shaw Cove".

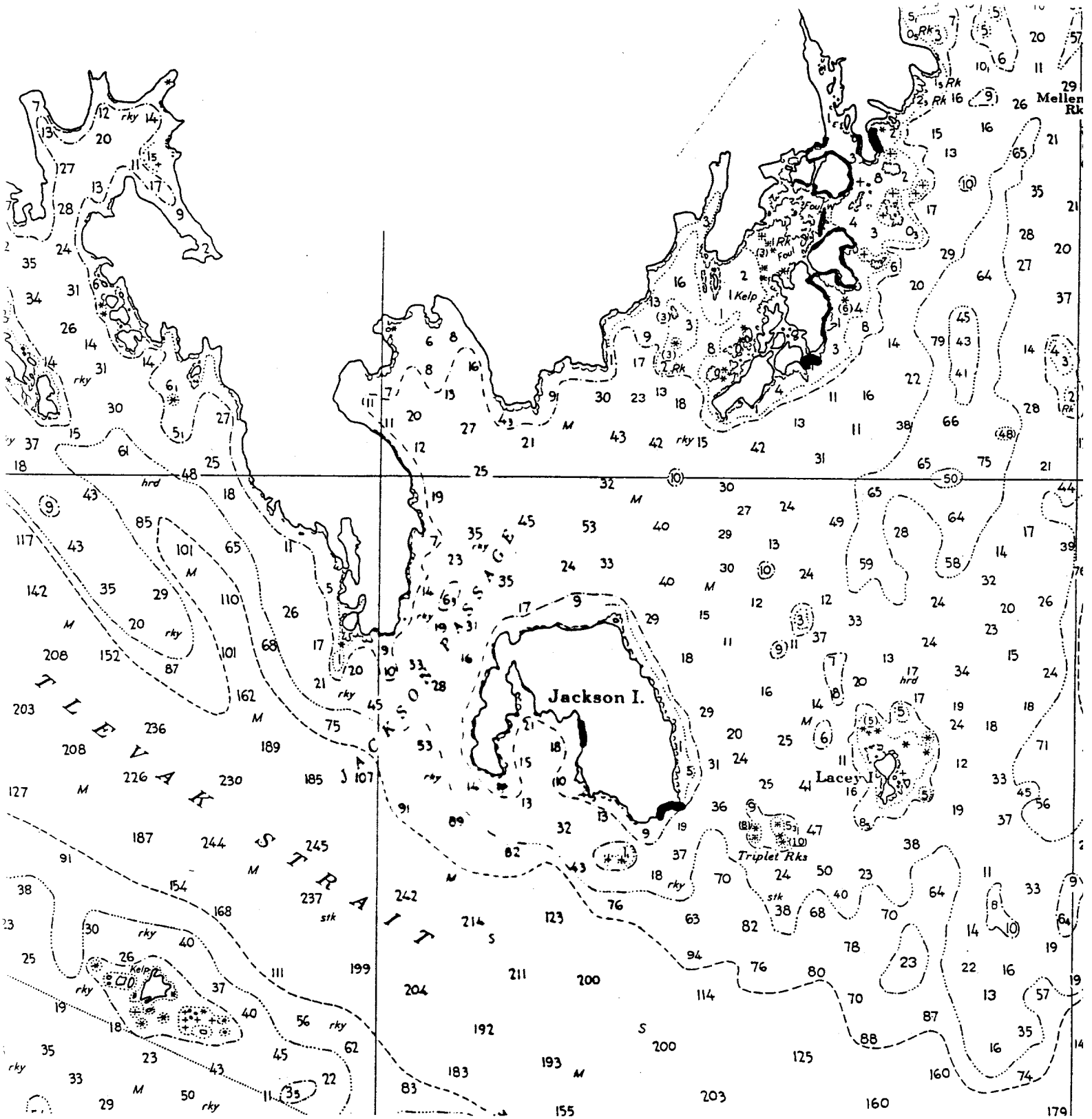
5-8 Aerial survey. Only a small patch (approximately 50 yards by 5 yards) of **ACTIVE SPAWN** seen just W of Ahduck Bay. No other signs seen.

A total of a little over one mile of spawn was documented this year in Yakutat Bay.

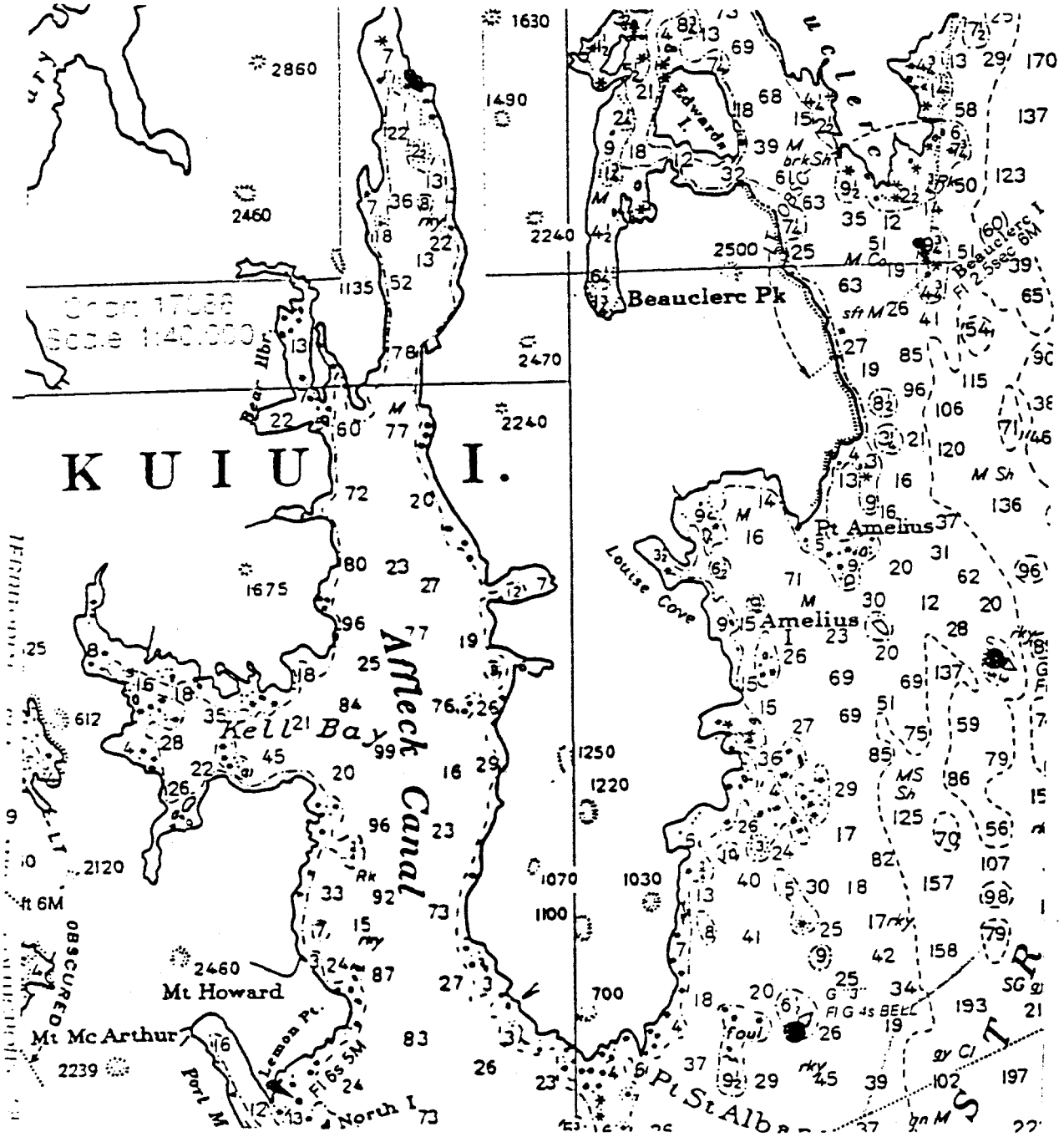
1993 HERRING SPAWN
KASSAAN



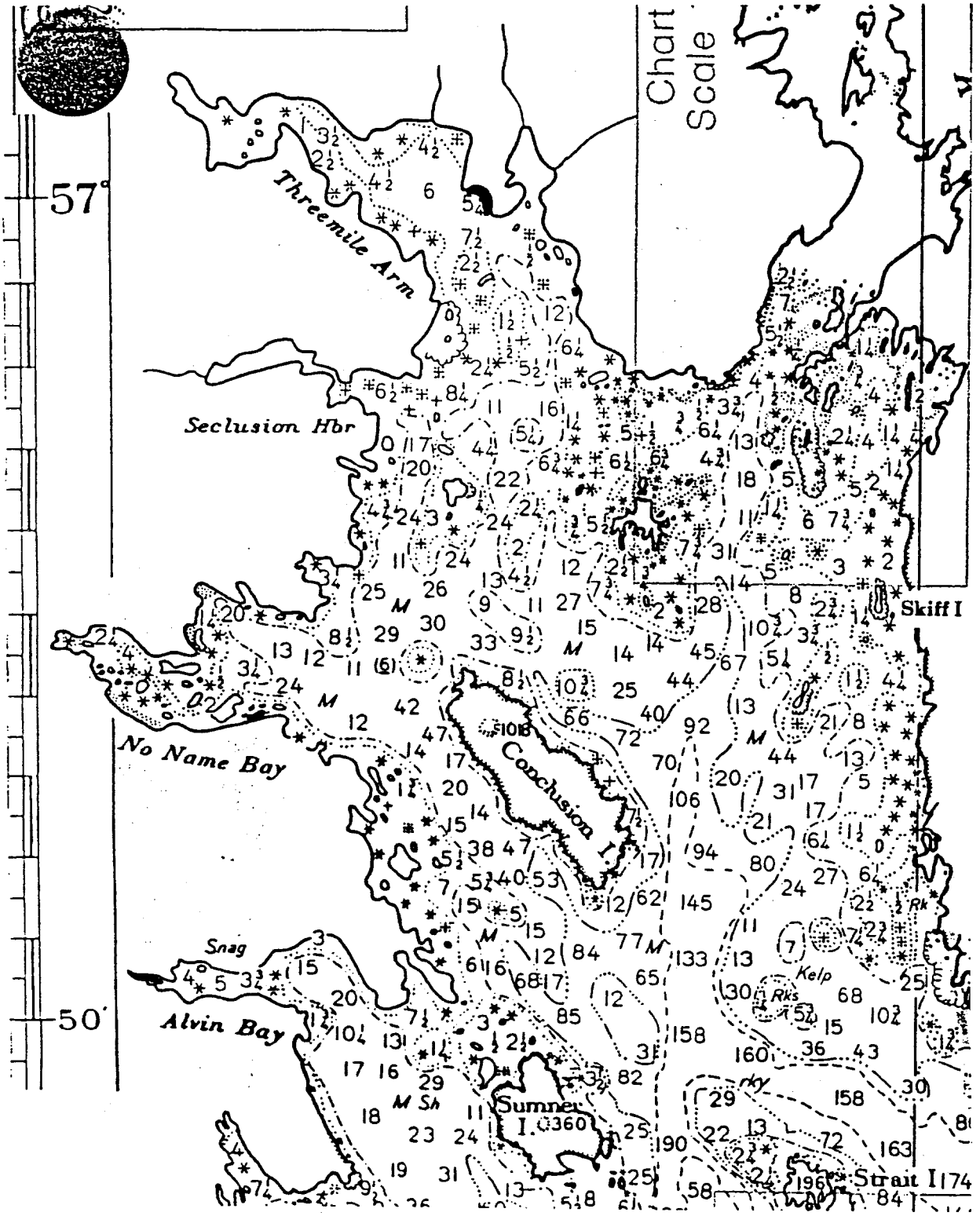
1993 HERRING SPAWN
HYDABURG



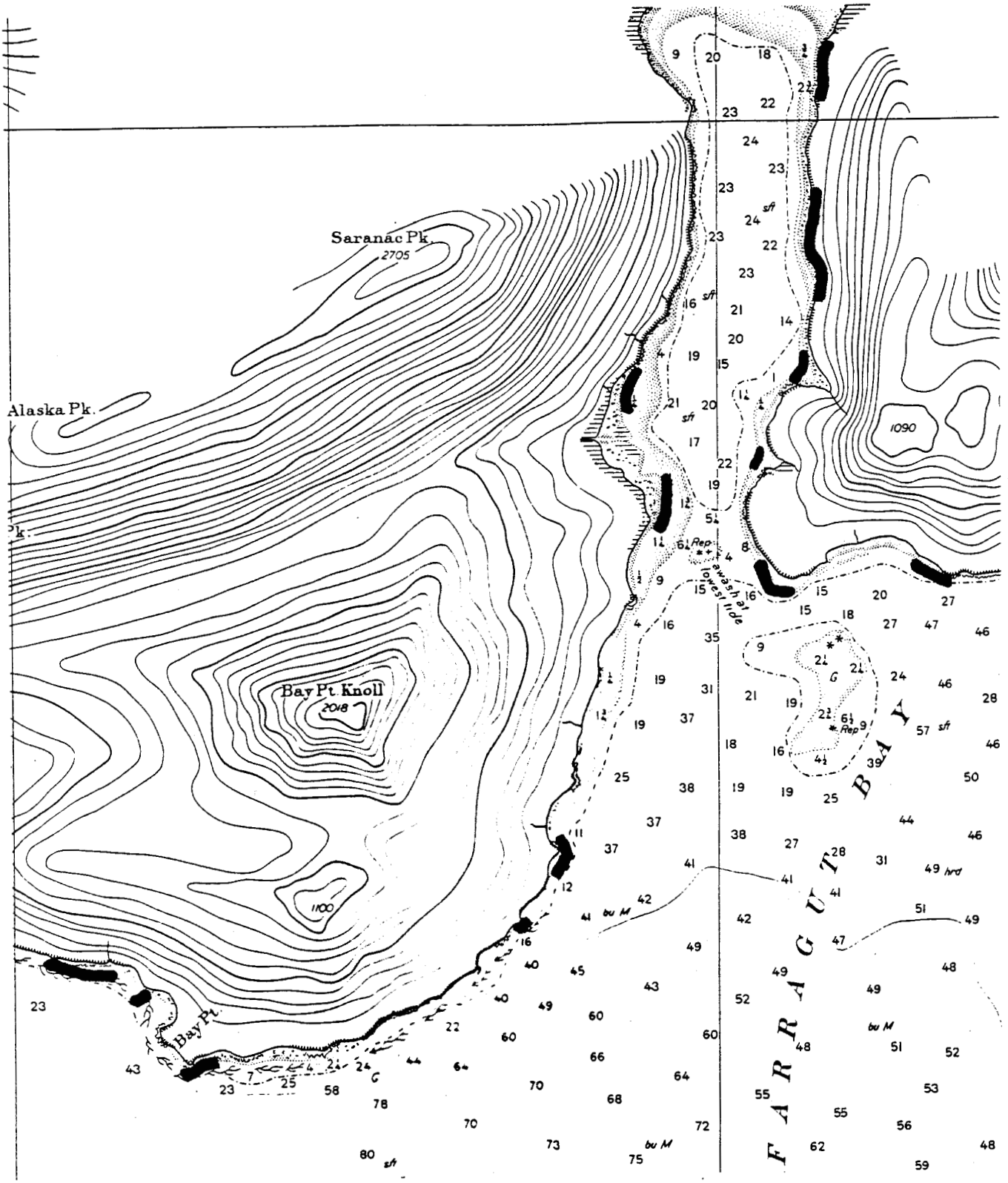
1993 HERRING SPAWN
AFFLECK CANAL



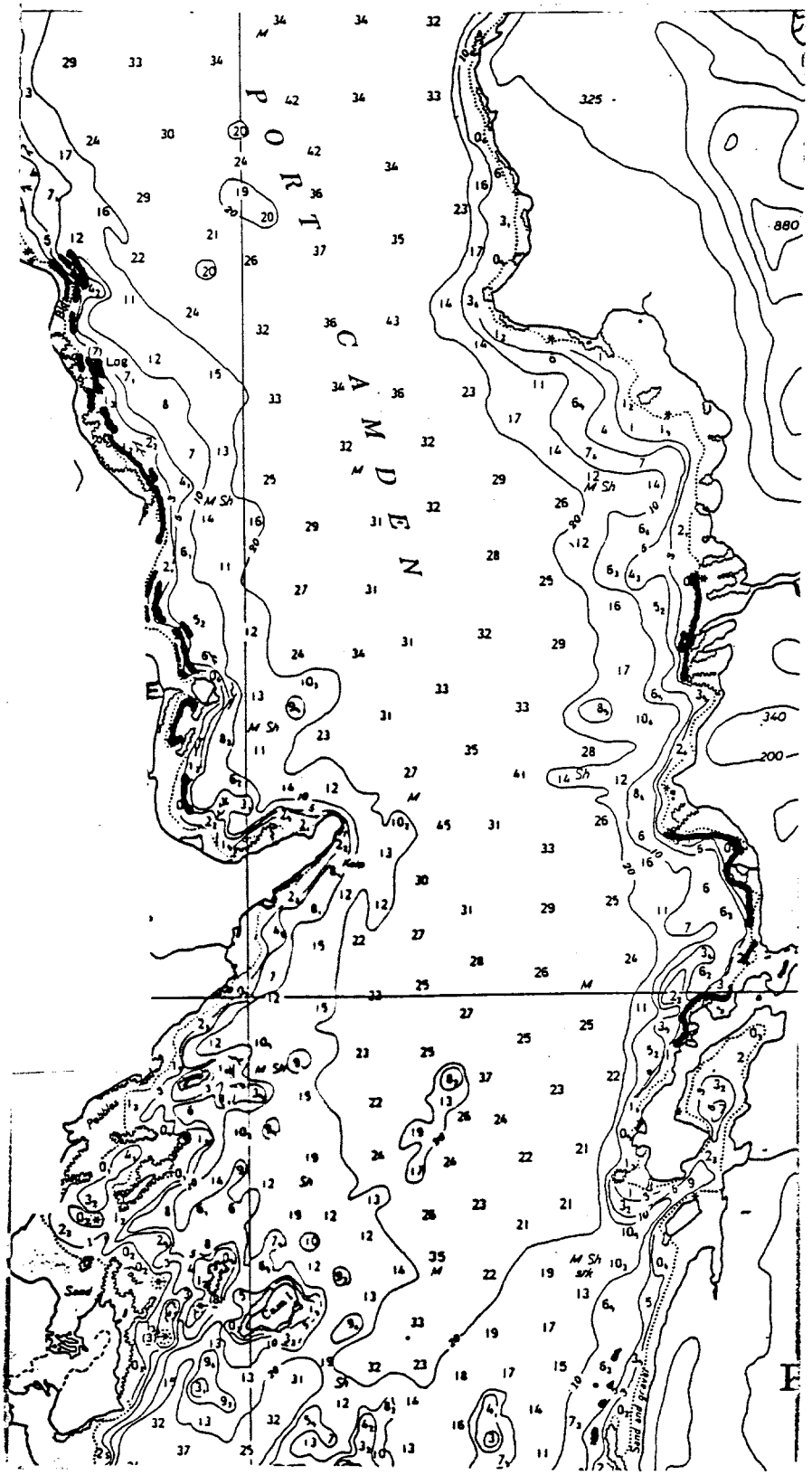
1993 HERRING SPAWN
THREE MILE ARM
NO NAME BAY
ALVIN BAY

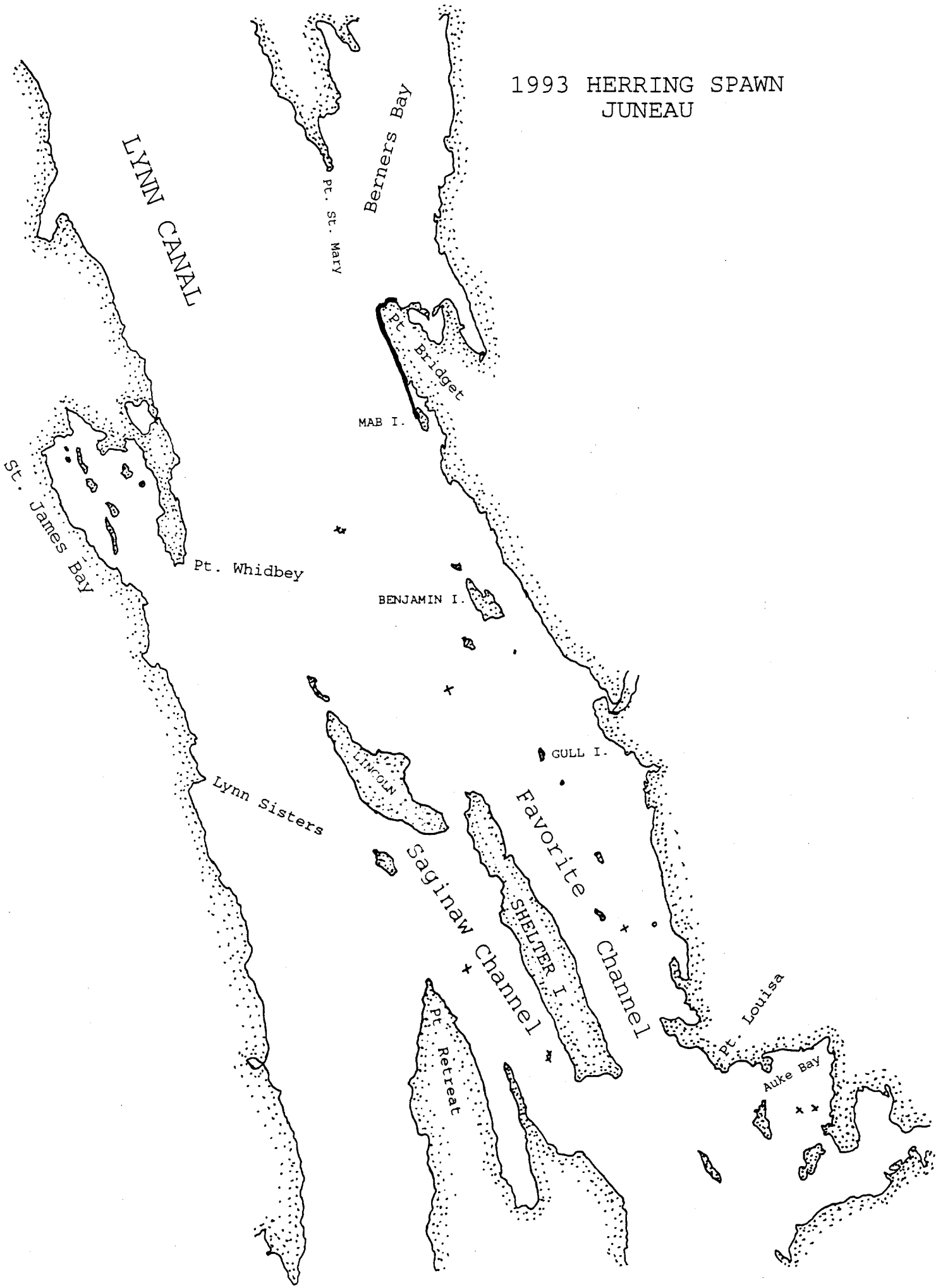


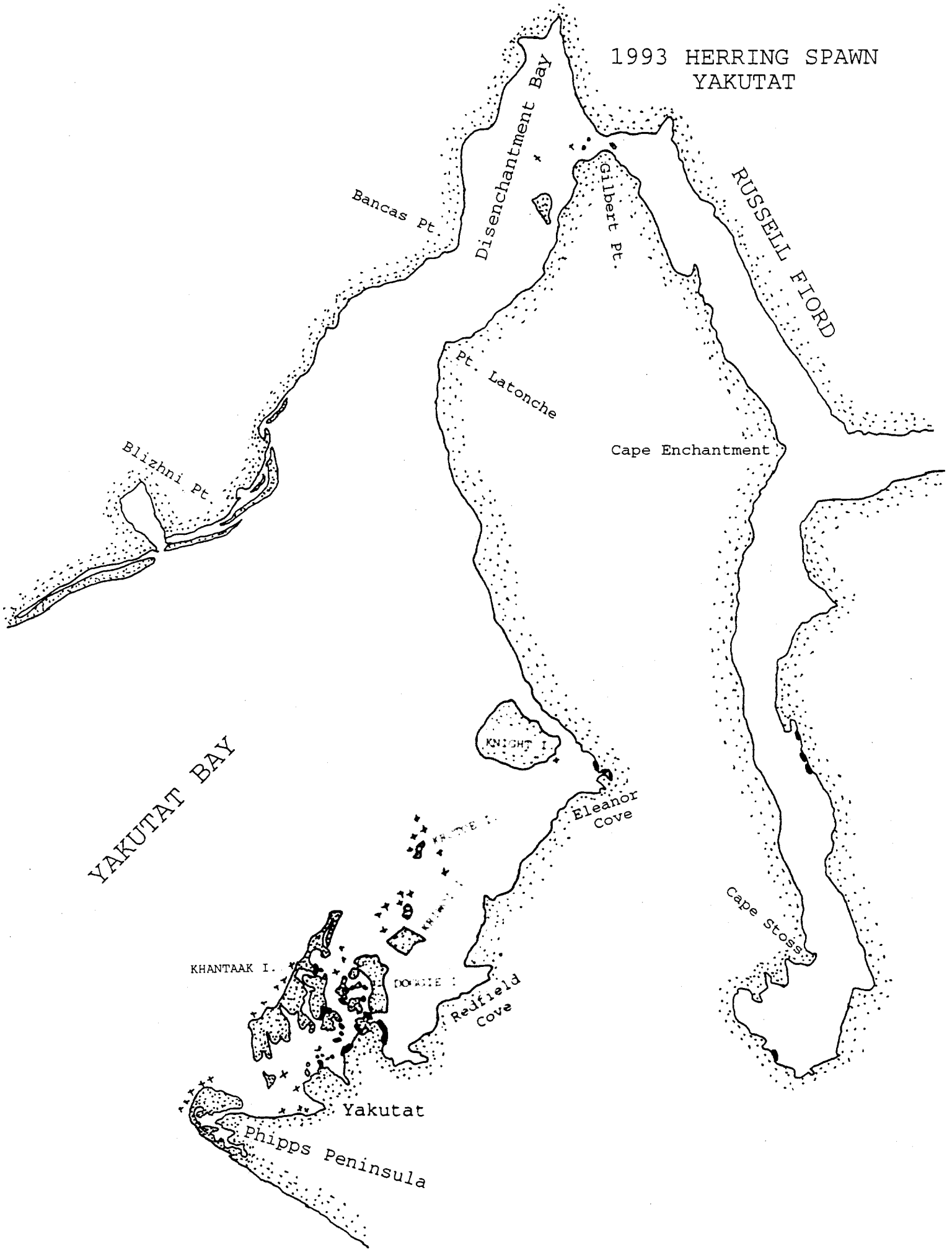
1993 HERRING SPAWN
FARRAGUT BAY



1993 HERRING SPAWN
PORT CAMDEN




1993 HERRING SPAWN
JUNEAU
LYNN CANAL
Berners Bay
Pt. St. Mary
Pt. Bridget
MAB I.
St. James Bay
Pt. Whidbey
BENJAMIN I.
GULL I.
LINCOLN I.
Lynn Sisters
Saginaw Channel
SHELTER I.
Favorite Channel
Pt. Retreat
Pt. Louisa
Auke Bay


1993 HERRING SPAWN
YAKUTAT
Disenchantment Bay
Bancas Pt
Gilbert Pt.
RUSSELL FIORD
Pt. Latonche
Cape Enchantment
Blizhni Pt
YAKUTAT BAY
KNIGHT I
Eleanor Cove
Cape Stoss
KHANTAAK I.
Redfield Cove
Yakutat
Phipps Peninsula

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